



Scanning -- Shortwave -- Satellites -- Ham Radio -- Computers

Monitoring Times

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Volume 23, No. 4
April 2004

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TEXAS TRUNKING

Also in this issue:

Southern California Combat Air Patrols

Spring Propagation Forecast

MT Reviews: Uniden's BC-296D

AOR's AR-ONE!



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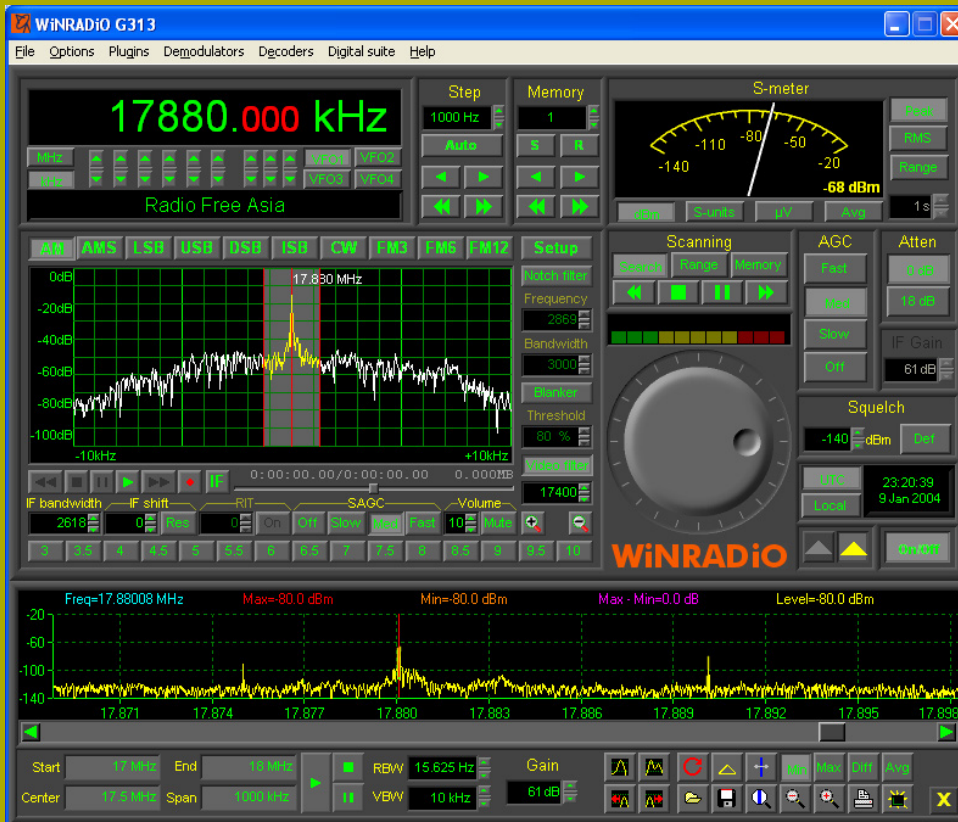


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Specifications

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Sensitivity: 0.25 μ V (AM, 10dB S/N)

S-meter sensitivity: 0.1 μ V



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Monitoring Times

Vol. 23, No. 4

April 2004



Cover Story

Inside the Austin/ Travis County Trunked Radio System

By John Mayson

Following some near-disastrous incidents in the 1990s in which public safety agencies could not communicate with each other, Austin, Texas, elected to install a new Motorola digital trunked system. It went on line in the spring of 2003, but hobbyists could not follow the faster control channel until this newest generation of scanners.

Today there are several scanners capable of 9600 bps trunk tracking, and the Austin system is well on its way to being mapped out by hobbyists. Here is what has been gleaned so far of the frequencies and talkgroups on this state of the art communications system. Story starts on page 12.

Cover photo: "I got to spend a sunny afternoon with my son downtown taking pictures for this article. I sometimes forget just how much there is to do in Austin. We have the state Capitol, lots of museums, great food, an active nightlife, and a laid back atmosphere." John Mayson

How Wide Area VHF Radio Systems Work 16

By Dan Yemiola

In simple terms and numerous graphics, the author illustrates various configurations which enable repeater systems to operate over a large area, adapting to the needs of the agency and characteristics of the terrain.

Monitoring Southern California Combat Air Patrols 18

By Laura Quarantiello

Combat Air Patrols (CAP) had all but disappeared from American skies, but the terrorist attack of 9/11/2001 changed all that. Today, although patrols fly on reduced, irregular schedules, a number of bases are always on active alert. To tune in to air patrols over Southern California, here are the frequencies, callsigns and brevity codes.

Propagation Outlook for Spring 21

By Tomas Hood

The vernal equinox brings changes in radio propagation characteristics from such atmospheric phenomena as aurora, sporadic-E and meteor showers. How do these affect radio waves and what is the prognosis for spring 2004 at this point in the solar cycle?

Monitoring Times Hot 1000 HF Frequencies 24

By Larry Van Horn

A list of the most active and interesting nonbroadcast frequencies in the shortwave frequency spectrum, selected by *MT's* assistant editor. There's not room to run the entire list in this issue, so this list will be continued through several editions and will be posted on the *MT* web page when complete.

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Reviews:

The **Uniden BC-296D** is a good radio for all-purpose listening with its wide frequency coverage and great flexibility in search capabilities, step sizes, modes, and bandwidth choices (see page 78) – great for monitoring the Austin TRS.

You've been seeing the ads for AOR's new to-end **AR-ONE** receiver. *MT* finally got its hands on one, though this unblocked receiver isn't for sale to private citizens. Most notable are its incredible 10kHz - 3.3 GHz range, high intermod rejection, PC control flexibil-

ity, and small size. (See page 82.)

TRX Manager provides computer control over almost everything in your radio shack – and beyond! For decoding and viewing HF Fax and NAVTEX messages, **SeaTTY** is smart and easy. (See page 80.)

The *Gadget Guy* reviews several accessories of interest to the radio enthusiast who wears his radios – the **CM-Pro radio harness**, **Hands Free radio harness**, and **C Crane's Voz** earpiece (page 86).

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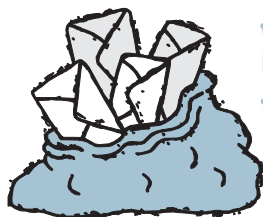
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LETTERS

TO THE EDITOR

Correcting the Record 1

Milan Hudecek of WiNRADiO pointed out that we omitted the WR G303i model in the summary of DRM-capable radios in the February *Computers & Radio* column. The series examined various options for reception of Digital Radio Mondiale digital shortwave. Readers interested in DRM reception will want to take the following points into consideration:

- "1. The G303i is the first consumer receiver which works with DRM without any need for modifications.
- "2. The G303i is the first (and still only) PC-receiver which has its own fully integrated software.
- "3. The G303i has won 5-star rating and "Best PC-based Receiver Award" from the *WRTH* (2004 issue), not mentioning other independent reviews such as a glowing one in the *Shortwave Magazine*.
- "4. The G303i is the only receiver which is specifically supported by tailor-made software on the DRM Web site. The receiver itself has been developed in close consultation with DRM (see <http://www.winaradio.com/home/drm.htm>)."

— Milan Hudecek, WiNRADiO

Correcting the Record 2

Glenn Hauser sent in the following correction to a "correction" made to his January *Global Forum: Shortwave Broadcasting* column.

"I just happened to notice that in the Jan 2004 issue of *MT*, in your *Shortwave Broadcasting* column, what I presume was a 'helpful' editor at the magazine changed my report of programming on Western Sahara radio. I *had* written in my original email to you: 'The program has been commentary interspersed between exceptionally interesting and beautiful vocal music with what sounds like an oud (and percussion) accompaniment...'"

Oud was changed to *loud*, "rendering this as a rather meaningless description, with poor syntax to boot."

"FYI, as you probably know (but not known, apparently, to an *MT* editor) the oud is a musical instrument. The Merriam-Webster dictionary describes it as being 'of the lute family used in southwest Asia and northern Africa' – that's what I heard, and that's what I meant!"

— Steve Waldee

My apologies! This is particularly embarrassing to this editor since I'm interested in unusual musical instruments, and actually knew better.

Grundig Mini 100PE

"I wanted to let you know about the Grundig Mini 100PE. It is a great little radio. For \$29.95 it's not a bad deal. I have put in one set of Duracells and it just keeps going – it won't die and it sounds great, too. The other radios I use are Sony ICF2010, Grundig YB400, YB400PE, YB550, GE Superadio and my favorite BC-348Q. Also Radio Shack PRO20323, BC2500 scanners, Yaesu FT50R, Radio Shack HTX202 and a Cobra 2000GTL.

"I'm a longtime subscriber to *MT* and look forward to reading it every month. Keep up the great work you all do to put this publication out."

— Marty Sanchez

Bob Grove comments, "Very few readers will recognize the BC 348Q. Tuning from 150 kHz-18 MHz, this was the most popular receiver to appear on the surplus market after World War II."

Family Radio Feedback

Though I am tardy in printing this letter written in response to Bob Grove's October 2003 article "FRS in Perspective" – a comparison of Midland G-225 versus an older Cherokee pair – the observations are very interesting.

"My experiences with FRS radios have been different. I have a pair of Motorola FR50s. They have the 3 in. rubber duck antenna and use three AA batteries. I do wish they had the 38 CTCSS tone squelch; the model FR60 did. Both models are now out of production.

"My experience with the range on these units is: 5 - 7 miles over flat, but not clear terrain. There was a thick, large stand of trees, halfway between us. I was amazed. I repeated this test several times, in different weather, etc. with the same results. From a person on the ground to one in a car averaged 1-1/2 to 2 miles.

"We also tested some 2-Watt Audiovox units as we tested my Motorola's. The Audiovox were no stronger than my 1/2-Watt units. Again, a surprise.

"I did notice one feature on the Motorola that I feel helped make the difference. That was an outstanding receiver. Seldom did you ever have to push the Monitor button to hear other units.

"Maybe you could get a pair of Motorola FRS radios and test them in a future article. They are quality units. I paid \$32 for the pair a year ago. Money well spent."

— Gary Hickerson, Arkana, OK

I note we have not reviewed a Motorola model since 1999. Perhaps Jock Elliott will

revisit Motorola's current crop to see if they perform as well as those discontinued models. Given the curious behavior of radio waves, I think all communications radios should carry the disclaimer "Results may vary..."

Station Identifications

Kevin Cary forwarded this query and answer in case it is helpful to others in identifying the following signal:

"I know you're the monitor for 500 kHz and below, but I have an AM signal at 570 kHz here in Melbourne, FL, that we locals cannot identify. It is a time station which broadcasts a tick on each second and a tone on the minute. Then the call sign RR is broadcast in Morse code. There is a Spanish AM station on that frequency but the time ticks can be heard over it. A Web search has produced nothing, do you have any information on it?"

— Bernie Lukas W4EDX

"Thanks for your note. The station you're hearing is Radio Reloj (Spanish for "Radio Clock") from Santa Clara, Cuba. "RR" is a time service that people can tune to using a simple AM radio. There are other Reloj stations in Cuba, but 570 is the only one I have heard logged in the U.S., possibly because it is a relatively clear frequency here. It's not reported very often, however, so congratulations on your catch!"

— Kevin Carey

"I really enjoy reading *Monitoring Times*! It's really informative – I can't wait to get each new issue. Keep up the good work! I run an Icom IC-R75 and a longwire up 50 feet.

"I was tuning around below the CB band the other day and I heard what I thought was a pirate radio station at 26.45 MHz. It was playing classical music and a women's voice identified it as 'the radio diva network.' I'm not sure if it is a pirate or if it's legal, because every so often the woman would give the call sign WPZA598. Have you guys heard of it?"

— Murphy Sweet

Murphy got his own answer by looking up the FCC records online, and discovered the station was licensed. When he emailed the station to ask for more information about the station, here is the reply he received. Thanks for sharing this, Murphy!

"Thanks for the e-mail. What you heard on 26.450 MHz was the H.F. feed of the Radiodiva Network. We provide programming via fiber optic link and shortwave to

our affiliate broadcast stations. Programming began on Dec 15, 2003 and the H.F. transmitter was fired-up on Jan. 1, 2004 at 0000 UTC.

"Our studio is located in Dallas, Texas and the FCC has restricted our output power to 100 watts, but that is more than enough to get a signal into Reno!"

"Right now our format is classical music. Within six months we will change format and play music solely from female pop/rock artists, hence the name "Radio Diva".

"I hope this helps. Thanks for your interest!"

— Marty Reeves

Support for Monitoring Times

"As per the *Closing Comments* in the January 2004 *MT*, I'd like to show my support of *MT*. Is a lifetime subscription to *MT* available? If so, cost?"

— Kraig Krist, KG4LAC

Many thanks for the expression of support, Kraig! It's been many, many years since we have discussed the possibility of a lifetime subscription. However, in fairness to both the subscriber and the magazine, I suspect it isn't the best idea.

Given the volatility of the magazine and hobby market, it's more fair to everyone if we simply try to keep the subscription as close to actual cost as possible. That way neither the magazine nor the subscriber gets burned badly if expenses change. Three years out is probably as far as any of us would like to predict and would be a great vote of confidence!

"On January 2nd this year I renewed my subscription to *MT* for 3 years. Apparently I was slow to renew and missed the January issue. Is it still possible to acquire that copy? I did pick up the February issue at the local book store today. I hope that puts me back on track. *MT* is my favorite radio magazine and I've seen them all since I got into the ham/monitoring hobby 40 years ago. So missing an issue is somewhat painful! Guess it's my 'post-it-note' generation of paper memory that I've entered. Anyway, please advise."

— Robert Kissel, W8KPU

"Like many of your readers I didn't receive the January 2004 issue of *MT*. I mark the beginning of each month knowing *MT* will be in the mail box! When it didn't arrive I called and was initially very disappointed to learn that a replacement copy was not available. The offer to extend my subscription by one month was a nice gesture, but it doesn't replace the info each issue offers.

"I decided to try the electronic version that uses the same PDF technology I use to distribute our newsletter. WOW! I never realized the photos are all in living color. I have access to a Xerox printer that actually binds the pages to form a book, so the end result I achieved is actually more durable than the printed version I've been receiving.

"Adobe's technology now allows me to export my favorite columns to separate folders and the end result will be a slightly smaller paper recycling pile each week. Now, if I could only get all the catalogs my wife receives in PDF!

"I'm sold. I'll be calling your subscription department to see if they can convert my recently renewed paper subscription to the electronic version. I'd like to make mention of this in our newsletter and I'd like to include a link so readers can obtain a sample copy in PDF. Do you offer a sample link?"

"Please feel free to share my enthusiasm with your readers."

— Bob Kozlarek

We don't know why so many issues had to be replaced in January — it may have been a combination of holiday mail and January renewals that didn't meet the deadline. We truly regret those we were not able to replace. But for those wanting to download a sample issue using electronic delivery, you can try it out at <http://www.monitoringtimes.com/html/freemt.html>

MT Express delivery has in fact gotten even better. Here are a few comments from folks downloading it from our new high-speed server.

"A quick note to congratulate you on the new procedures for *MT Express*. It is easy, and user-friendly. Nice to receive the new edition so early — don't know how well the

US Postal Service handles the printed edition, but Canada Post is truly the manifestation of the title "snail mail".

— Ray White VA3RAY

"Here's a switch!! Just wanted to tell you I LOVE the new site. Did not have a problem at all with the new way, unlike the old way. Thought I would give you a GOOD JOB note."

— Stephen Nelson

"Greetings. Wow. Nice improvement from the previous download service. If this is the new download service, I will renew my subscription. Thanks for the opportunity. How do I go about resubscribing?"

— Vince

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We welcome your ideas, opinions, corrections, and additions in this column. Please mail to **Letters to the Editor**, 7540 Highway 64 West, Brasstown, NC 28902, or email editor@monitoringtimes.com. Letters may be edited for length and clarity.

Happy monitoring!

— Rachel Baughn, KE4OPD, editor

MORE BOOM FOR YOUR BUCK!



Antenna Crossarm Boom (Design 1)

With 4-ft. or 2M (78-3/4") lengths, and designed for mast or tower, static or marine mountings, this boom fits the bill! Unique structural platform mounts four magnetic-base mount antennas **OUT AND AWAY** from mast or tower.

Four Foot Steel with four different antennas pictured above. Other uses include a versatile Meteorological sensor platform, surveillance cameras and supports for Photographic and studio lighting. Stacked arrays have multiple Military applications: amphibious operation voice and code communications plus RDF.

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Monitoring and the Law

Be My Guest

There is an Indian proverb that says “Tell me a fact and I will learn; tell me the truth and I will believe; but tell me a story and it will live in my heart forever.” These stories that follow – “war stories” some would call them in the never ending battle for listeners’ rights – are a departure from our usual coverage of state and federal laws on the use and possession of police scanners and monitor radios. They illustrate important additions to the body of law that covers this field: There are other rules out there besides the law.

It is amazing how the popularity and proliferation of electronic devices can bring about change, oftentimes more effectively and with more speed than the powerful lobbying of Congress, via the many members of powerful organizations like the National Rifle Association (NRA) or the American Association for Retired Persons (AARP). These two groups are among many who are well known for their ability to flood Congress with thousands of messages on whatever topic is of highest concern at any particular moment.

Many years ago, in the late 1980s as cellular telephones were starting to spread, the new devices were often unwelcome in some places. The Federal Courthouse in Miami, Florida, for example, did not allow persons to enter the courthouse with a cellular telephone. No real reason was given. No order of the court was shown. No facilities to secure the devices were provided. You had to leave them outside. Cellular telephones at the time were just going from briefcase size, literally, to lunchbox size. The popular Motorola “brick” handheld was still years away. We also did not have the post 9/11 “war on terrorism” rationale that we have in America now.

Today, the popularity of the mobile phone is such that most courthouses allow them in, although the newest trend – camera phones – is again causing some distress in federal courts. Adhering strictly to the rules that there should be no cameras in the courtroom, federal courthouses around the nation are once again requiring visitors to surrender their mobile phones (as well as Personal Digital Assistants and other electronic devices) at the door if those phones include the ability to take pictures. Guests are advised by order of the court to check their camera-equipped mobile phones and devices at the security checkpoint as they enter. So the question arises, when can the government, absent a law, make such regulations? And, similarly, when can private companies ban scanners and two-way radios?

❖ If You Can’t Beat ‘em...

Before the popularity of the Family Radio Service (FRS), the sight of civilians in public using two-way radios sometimes meant that you had stumbled onto a local police undercover operation. It was rare to see ordinary folks going about their daily routine and using a two-way radio, or walkie-talkie as many liked to call such devices. FRS has really changed all that.

What was once viewed as odd – persons like you and me, out in public, using a two-way radio – is now commonplace. Even private property owners that frowned on their guests having and using such devices seem to have changed their tune. Most recently, the Disney Company’s Walt Disney World Resort near Orlando, Florida, seems to have done an about face on their old rule which prohibited two-way radio and scanners in the parks.

While we still don’t have the official word on this (and we have asked the top mouse himself), Walt Disney World Resort’s recent television ad showing four women using a two-way radio in front of the EPCOT entrance’s Spaceship Earth seems to approve the use and possession of radios on the property. The ad shows four wives talking to their husbands who are supposed to be at one of the other theme parks – the Disney / MGM Studios. (In reality the men sneaked off to one of the resort’s several golf courses, but they report back that they are at one of the thrill rides of the theme park instead.)

Years ago such an ad would have run counter to the rule (in the theme parks, at least) that guests were not allowed to have two-way radios or scanners. In fact, as one story goes, a Disney security guard approached a guest using a UHF two-way radio and inquired if it could receive the park frequencies which were in the 460 MHz range. The guest who was doing exactly what the actors in Disney’s new ad are doing explained that he was talking to his friend at another part of the property. He was still asked by Disney security to not use the radio in the park and to leave it outside the park on his next visit.

❖ Discretion - the Better Part of Valor

In addition to court rules and private property owner’s bans like these on two-way radios, there are federal regulations that are cloaked with the authority of statutory law, but are not necessarily codified into the United States Code – federal statutory law. For example, the Federal Aviation Administration’s Federal Aviation Regulation on the use of electronic devices aboard aircraft

(FAR 91.21). This is the rule that accounts for the warning all aviation passengers hear before take-off and landing to please turn off all portable electronics.

Even turned off, the presence of a two-way radio for many is an intimidating sight. Security and privacy concerns become foremost over individual rights. Hobbyists and licensed users of two-way radios and police scanners should exercise discretion when, where and how to use their equipment and enjoy their hobby with caution, lest we continue to frighten the powers that be and find ourselves dealing with more and more restrictions on our right to listen.

FAR Sec. 91.21 - Portable electronic devices.

(a) Except as provided in paragraph (b) of this section, no person may operate, nor may any operator or pilot in command of an aircraft allow the operation of, any portable electronic device on any of the following U.S.-registered civil aircraft:

(1) Aircraft operated by a holder of an air carrier operating certificate or an operating certificate; or

(2) Any other aircraft while it is operated under IFR.

(b) Paragraph (a) of this section does not apply to —

- (1) Portable voice recorders;
- (2) Hearing aids;
- (3) Heart pacemakers;
- (4) Electric shavers; or
- (5) Any other portable electronic device

that the operator of the aircraft has determined will not cause interference with the navigation or communication system of the aircraft on which it is to be used.

(c) In the case of an aircraft operated by a holder of an air carrier operating certificate or an operating certificate, the determination required by paragraph (b)(5) of this section shall be made by that operator of the aircraft on which the particular device is to be used. In the case of other aircraft, the determination may be made by the pilot in command or other operator of the aircraft.

Disclaimer

Information in this column is provided for its news and educational content only. Nothing here should be construed as giving specific legal advice. Persons desiring legal advice about their specific situation should consult an attorney licensed in their jurisdiction.



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FCC Okays BPL Proposal

The FCC has unanimously approved a Notice of Proposed Rule Making (NPRM) to deploy Broadband over Power Line (BPL). The NPRM is the next step in the BPL proceeding, which began last April with a Notice of Inquiry that attracted more than 5100 comments—many from the amateur community. The FCC did not propose any changes in Part 15 rules governing unlicensed devices, but said it would require BPL providers to apply “adaptive” interference mitigation techniques to their systems. An ARRL delegation that included President Jim Haynie, W5JBP, attended the FCC open meeting in Washington, and later expressed disappointment in the FCC action.

“The Commission clearly recognized that the existing Part 15 emission limits are inadequate to stop interference, but it’s placing the burden of interference mitigation on the licensed user that’s supposed to be protected,” said ARRL CEO David Sumner, K1ZZ.

FCC Chairman Michael Powell called BPL “tremendously exciting.” While conceding that BPL has “a long way to go,” the chairman said it could be “the great broadband hope for a good part of rural America.” Powell also said the FCC’s OET has worked very hard to try to “get their hands around” the issue of interference and that the FCC would continue its vigilance in that area.

Additional information about BPL and Amateur Radio is on the ARRL Web site, <http://www.arrl.org/tis/info/HTML/plc/>. NNNN/EX

Issues in Broadcasting: BBC

The BBC suffered a stinging rebuke in a judicial review and the resignation of two senior administrators (BBC Director General Greg Dyke and Corporation chairman Gavyn Davies) in late January for reporting last May that the government had exaggerated pre-war intelligence about Iraq’s access to weapons of mass destruction. The BBC report and the government’s reaction set off a major political controversy and led to a chain of events that resulted in the apparent suicide in July of David Kelly, a weapons expert in Britain’s Defense Ministry, after he was identified publicly as the source for the story.

In addition to the resignations, the new acting chairman, Richard Ryder, issued a sweeping apology and promised reforms.

Hundreds of BBC employees have walked off their jobs and into the streets in spontaneous protests and many have questioned the impartiality of the judicial report and criticized the capitulation of BBC leadership.

This is already a delicate time for the BBC, whose government-issued charter is up for renewal in 2006. Many of its critics, including the Conservative Party and legions of journalistic and cultural competitors, believe it should be overseen by an outside agency, as Britain’s other broadcasters are.

One broadcaster spoke up on the BBC’s behalf, however – Jon Snow, news anchor on the rival Channel 4. “Whatever mistakes were

made, government clashes with the state broadcaster are dangerous; there are implications for every journalist,” he wrote in an email. “This is one of the most worrying and difficult days of my broadcasting career. We could find that the death of David Kelly ends up robbing Britain of the best public service broadcaster in the world.”

A broad examination of public service broadcasting is already underway, with a report to be published in April. The *Times* of London reported that the government is considering a range of proposals for the BBC, including breaking it up into separate units for England, Scotland, Wales and Northern Ireland.

Issues in Broadcasting: Europe

Public broadcasters all across Europe are facing increasing challenges from regulators, private-sector competitors, and viewers. Up for examination are reevaluations of their mission, the fees or taxes that sustain them, and their relevancy.

The financing and structure of public broadcasting varies widely across Europe. Some broadcasters are financed almost entirely by license fees or taxes; others rely entirely on commercial money; still others are a hybrid, accepting financing from both sources.

While viewers and private-sector companies complain about fees and government support, broadcasters wrestle with the difficulty of striking a balance between quality and commercial success. The BBC has drawn criticism for what some Britons say is a dumbing-down of the broadcaster’s once-highbrow programming, while others welcome the move away from what they see as a snobbish tradition. But others wonder if the new marketplace mentality was a factor in recent lapses at the BBC and Radio France 2.

As the furor over a report critical of the BBC’s reporting on the British government’s case for war in Iraq was easing (see previous story), France 2’s news director was forced to resign and a popular anchor was suspended. They had reported that the former prime minister, Alain Juppé, planned to resign from various political posts after being convicted on corruption charges, while Mr. Juppé was actually announcing on a rival, privately-owned channel that he planned to stay on.

In Italy, where the RAI public broadcasting system is governed by a board dominated by political appointees loyal to the prime minister, political pressure has led to loss of credibility. Increasing instances have come to light in which the prime minister used his influence to prevent programming critical of him or his government from being aired.

Regardless of the outcome of license fee reviews, commercial pressures on public broadcasters will only grow in coming years as governments manage the transition from analog to digital broadcasting. That will mean a proliferation of viewer choice, making life even more challenging for public broadcasters – even if they do not compound the damage with their own jour-

nalistic mistakes and political miscalculations.

Amending the Morse Code

In December, the International Telecommunications Union, which oversees the entire frequency spectrum from amateur radio to satellites, voted to add a new character to the venerable Morse Code.

“It’s a pretty big deal,” said Paul Rinaldo, chief technical officer for the American Radio Relay League. “There certainly hasn’t been any change since before World War II.”

In an irony of the digital age, the change will allow ham radio operators to exchange e-mails more easily. The new sign “@” – which will be known as a “commat” – consists of the signals for “A” (dot-dash) and “C” (dash-dot-dash-dot), with no space between them.

Tauzin to Retire

W.J. “Billy” Tauzin (La.), one of the most powerful Republicans in the House, will not seek reelection when his 12th term expires at the end of this year and vacated the chairmanship of the Energy and Commerce Committee effective Feb. 16.

Tauzin is remembered less than fondly by radio hobbyists for characterizing scanner listeners as “electronic stalkers” and for his orchestrated humiliation of *Monitoring Times* publisher Bob Grove who voluntarily participated in a public hearing when Tauzin was chairman of the House Subcommittee on Telecommunications, Trade, and Consumer Protection.

Rep. Joe Barton (R-Tex.) is seen as likely to take over Tauzin’s chairmanship.

Tauzin, 60, was hospitalized twice in recent months for health problems, including a bleeding ulcer. Tauzin was widely expected to succeed Jack Valenti as president of the Motion Picture Association of America but turned down the job – and its more than \$1 million salary.

Soon after, he received a larger offer to head the Pharmaceutical Research and Manufacturers of America (PhRMA), the trade group that represents drug giants such as Pfizer Inc. and Merck & Co. He is expected to take the PhRMA offer and leave the House before his term expires.



Apr 17: Seal Beach, CA

Southern California Area DXerS - SCADS 12 Noon to 4 pm, Farmers & Merchants Bank, Community Room (12535 Seal Beach Blvd) Subject: FM - AM DXing. Guest Speaker: Tari Livingston-Hughes. Bill Fisher billfishernow@netzero.net; <http://groups.yahoo.com/group/SCADS>

April 24: Chesapeake, VA

Chesapeake ARS Springfest at Hickory Ruritan Club, 2752 Battlefield Blvd S (GPS 36 37.703N 076 12.573W), call-in 146.82 (-offset), 9a.m., adm \$6. For more information see <http://www.qsl.net/cars> or contact Leo Kusuda KG4PWC kg4pwc@arrl.net.

Public Citizen, a public interest group, has called for an ethics investigation of Tauzin on conflict of interest issues.

D.C. to Test Emergency Transmission Network

The District of Columbia is testing a private wireless network for emergency communications that could become a template for cities around the country. The one-year pilot program will provide high-speed video, database and voice transmission to police, fire and other emergency workers throughout the city.

About 200 people from public safety agencies and Washington Metropolitan Area Transit Authority will be allowed to connect to the network on their laptops and handheld computers during the trial period, the city said.

The new wireless system will be set up by Motorola Inc., which is installing and maintaining the systems, and Flarion Technologies Inc., which designed the wireless technology.

Although the central purpose of the system is to provide reliable and secure communications and to coordinate response in an emergency situation in which cellular and conventional telephone systems often get clogged, it can also be used in daily applications. This would include such things as sending photos from a crime scene, scanning and sending out

photos for an Amber missing child alert, or transmitting video from a helicopter.

Flarion systems are already being tested in commercial networks in Europe and South Korea, and Nextel Communications Inc. in Reston said it would test Flarion's systems in Raleigh, where Nextel customers will be able to use its systems to send videos and other data.

Safety Net

Despite concerns from lawmakers, public safety officials, and the Department of Homeland Security (DHS), the road to interoperability is not only painfully slow, but a lot of folks aren't taking the same road to get there. (See *Closing Comments*, March 2004.) The country's 44,000 federal, state and local rescue agencies currently use scores of different radio systems on 10 different frequencies. David Boyd, director of the Wireless Public Safety Interoperable Communications Program (SAFECOM) at the DHS, has acknowledged that "we need solutions quickly."

One solution that takes diverse systems and allows them to talk to one another right now is the Aegis SafetyNet(TM) Radio Bridge, which interconnects incompatible radios and bridges them beyond their normal capabilities. The SafetyNet(TM) Mobile Command Post complements the system by adding broadband video, audio and other data.

Aegis is currently completing initial quality control testing of the SafetyNet(TM) Radio Bridge using radios supplied by major public safety agencies, including the Los Angeles County Sheriff's Department, Los Angeles Police Department, Orange County Sheriff's Department, San Diego County Sheriff's Department, Los Angeles Fire Department, and Anaheim Fire Department as it prepares to roll-out the SafetyNet(TM) Radio Bridge nationally.

"We want state and local officials to work with us. They own 95% of the infrastructure and they're the key to solving this," Boyd said.

Doing Away with the VOA?

See the *Program Highlights* by John Figlio on page 44.

"Communications" is compiled by editor Rachel Baughn from newscippings submitted by our readers. Many thanks to this month's contributors, Anonymous, NY; Sterling Marcher, CA; David Parsons, AZ; Doug Robertson, CA; Brian Rogers, MI; Donald Strumpf, PA; and by email from Anonymous, Maryanne Kehoe, Jerry None, D Prabakaran, Tom Sundstrom, Larry Van Horn, Dan Veeneman, and Barry Williams.

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Inside the Austin/Travis County Trunked Radio System

By John Mayson

photos by John Mayson

For the past six years I have had the pleasure of living in the city that *Money Magazine* recently described as having “a stylish, exciting urban life, but without a lot of the hassles big cities are known for.” It’s the seat of Texas’ state government and, for much of the year, home to over 55,000 college students. The city, if you haven’t already guessed, is Austin, Texas.

The city proper is home to over 650,000 residents who make up more than half of the 1.2 million people who call metropolitan Austin home. A thriving high-tech industry has lifted Austin from being a sleepy state capital and college town to major city. It is true that Austin does not have many of the hassles of a large city, but it’s not exactly Mayberry RFD either. After all, Austin is now the 16th largest city in the nation.

For the past twenty years Austin has relied on conventional UHF frequencies for their police, fire, and EMS services. The system has served the city well, but Austin finally outgrew their radio network. In fact, it was becoming dangerous. In 1996 Austin saw a six-alarm fire at the Centennial Condominiums. Austin Police Department (APD) cruisers were blocking fire hydrants and the city’s fire department had no way to talk to the police to get them to move their cars.

A year later during a domestic violence call, APD officers shot a Travis County Sheriff’s deputy. The other deputies knew who was walk-

ing out of the house, but APD did not and opened fire. The city studied the problem and proposed a countywide trunked radio system.

In May 2000, Austin announced it had selected Motorola to design and build an estimated \$70 million digital trunked system for Austin/Travis County. Rival Com-net Ericsson argued unsuccessfully that their trunked system was compatible or could tie-in with the area-wide Lower Colorado River Authority’s (LCRA), Bell County’s, and San Antonio/Bexar County’s trunked radio systems. Austin instead chose to continue their long standing relationship with Motorola. It didn’t hurt that Motorola plants in Austin produce the chips that go inside the equipment and that locally headquartered Dell would provide the computers.

The system came online in the late spring of 2003. Scanner listeners quickly discovered no commercially available scanner could track and demodulate the system. Thankfully, in December 2003 our friends at Uniden came to the rescue with two scanners that could monitor the Project-25 Phase II CQPSK modulation and 9600 baud control channel used by the system. On January 30th, Radio Shack made a surprise announcement that the existing Pro-96 handheld could be updated allowing it work with the new Phase II systems. The two handhelds (Pro-96 and BC-296D) and the desktop/mobile BC-796D are available from Grove Enterprises and other advertisers in this magazine.

◆ About Austin

Austin is the county seat for Travis County. However, Austin’s city limits do not stop at the county line. The city lies mostly in Travis County but with a significant portion in Williamson County. In order to provide the same level of service to all citizens, the Austin Police and Fire Departments and the Austin/Travis County EMS department provide emergency services to all of Austin regardless of county.

Austin’s trunked system has patches to Williamson County EMS, Bastrop County, and the LCRA. Austin is also licensed to use the five National Public Safety Planning Advisory Committee (NPSPAC) frequencies allowing for mutual aid communications to neighboring jurisdictions (see Table 1).

Austin Fire Department dispatches for the cities of Pflugerville, Oak Hill, Manchaca and Travis County Fire Control on 153.950 MHz. This is simulcast on talkgroup 1403 for the benefit of Austin/Travis County EMS. The private ambulance company AMR dispatches for Travis County Fire Rescue and will not use the trunked system due to cost.

◆ The System

There are two simulcast layers on this system, one is citywide and the other is countywide. The citywide layer has seven towers and can support up to nineteen simultaneous conversations. The countywide layer has eleven towers and can support up to twenty-three simulta-

neous conversations. In addition the system has several Intelli-repeaters to provide service in difficult coverage areas.

The system has two simulcast sites each with their own set of frequencies (see Table 1). Both city and county agencies appear on both sites. The Intelli-repeater sites do not use the Phase II CQPSK modulation and listeners reported they could monitor some traffic from the IR sites using a Radio Shack Pro-96. The "off the shelf" Pro-96 cannot demodulate the two main simulcast sites, but with the free DSP update it can.

The system provides communications for city, county, and state agencies in Travis County that includes: City of Austin, Travis County, Austin Independent School District (ISD), Capital Metro Transit, City of Pflugerville, City of West Lake Hills, Texas Department of Transportation, Texas Legislative Council, Texas House of Representatives, Austin Water & Wastewater, Austin Energy, Austin Community College, and the University of Texas at Austin.

◆ The Users

The system hosts over a dozen agencies. Here is a list of agencies of most interest to most scanner listeners.

Austin Police Department

Central Texas' largest law enforcement team is led by Chief Stanley L. Knee. APD has more than 1,300 officers and about 500 civilian employees with a \$155 million budget.

APD has divided the city into nine sectors:

Sector	Location
Adam	Northwest
Baker	Central West
Charlie	Central East
David	Southwest
Edward	Northeast
Frank	Southeast
George	Guadalupe Street, Sixth Street, Warehouse District
Henry	Downtown
Ida	North Central

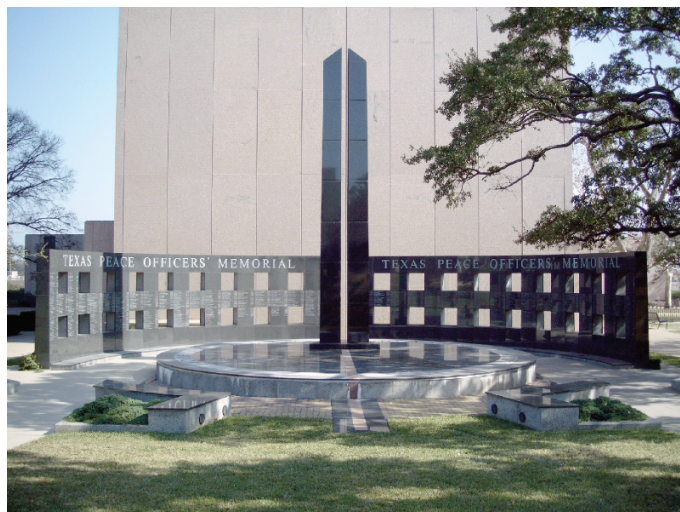
According to crime statistics, Austin has less than 65 crimes per 1,000 people per year, making it one of the safest cities in the nation. Super job, APD!

Austin Fire Department

AFD boasts over 1,000 firefighters working 40 active fire stations, an aircraft firefighting/rescue station at the airport, and seven office sites. All recruits must pass a rigorous 28-week, 1,100 hour academy. Over 200 hours are taken up by medical training. All must pass state-administered exams and be certified as EMTs and firefighters.

Austin/Travis County EMS Department

All Austin/Travis County EMS personnel operate under the medical direction of Dr. Ed Racht, M.D. A total of 38 different emergency service agencies fall under the EMS umbrella and



include LCRA Rangers, Austin-based DPS (state police) troopers, and corporate first responders.

A/TC EMS employs almost 300 paramedics, operates 22 ambulances, 5 rescue ambulances, a tactical paramedic ambulance and 2 rescue helicopters. They are recognized in the emergency medicine community as being one of the best EMS departments in the nation and Austin is considered one of the best cities in which to suffer a heart attack.

Not only do we have some of the best paramedics in the nation, we have pushed hard to place automatic external defibrillators (AED's) in public spaces such as the airport and malls. Since the new airport opened in 1999, airport police have saved four lives using AED's. When a person has suffered a heart attack, an AED can increase the odds of survival by as much as 40%, but they must be used immediately. A three to five minute response time for EMS is good, but still can be deadly to a cardiac patient. Early access to an AED is critically important.

Twenty-four area employers operate medical emergency response teams. They can get much needed medical care to employees and visitors while EMS travels to the scene. These teams, employed at places such as Abbott Labs, Applied Materials, IBM, Motorola, Solectron, and 3M, are trained to give CPR, provide oxygen, operate an AED, and treat life threatening injuries.

Travis County Sheriff's Office

Sheriff Margo Frasier leads the county's law enforcement department. TCSO is responsible for providing law enforcement in unincorporated areas of Travis County and operate the county jails. TCSO also operates boat patrols on the area lakes west of the city.

Austin Civilian Defense Battalion

This group was the first of its kind in the United States after September 11th. Their mission statement says they are "to be in readiness as well-trained civil defense volunteers to support the work of the Austin Police Department."

The CDB consists of four companies of citizen volunteers who act as the eyes and ears of the Austin Police Department. They can patrol on foot or in marked maroon Ford Crown

Victorias.

Company "A" is the Aviation Detail and assists travelers with transportation and housing during times of crisis or closure of the airport.

Company "B" is the Homeland Security Supplemental Service. They assist APD with duties such as daylight patrols of areas experiencing increased crime, parking control and access to city buildings, and working special events.

Company "C" is the Headquarters Detail. They work in the main police building assisting visitors, answering phones, making copies, or anything else with which APD needs assistance.

Company "D" is the Homeland Security detail. They disseminate information through "telephone trees," assist with non-emergency 3-1-1 calls, maintain lists of citizens with language skills, and enlist help from the community in times of crisis.

Volunteers for the CDB must have normal hearing and vision, ability to stand for two or more hours at a time, be able to lift at least 20 pounds, and pass a criminal background check.

◆ Closing

The citizens of Austin and Travis County can sleep well at night knowing they have thousands of dedicated professionals working to keep them safe and a state-of-the-art communications system keeping those professionals safe.

I got to spend a sunny afternoon with my son downtown taking pictures for this article. I sometimes forget just how much there is to do in Austin. We have the state Capitol, lots of museums, great food, an active nightlife, and a laid back atmosphere. When you get the chance, pack up your scanner and head down to Austin. We'd love to have you!

I'd like to take this opportunity to thank Wes Ogilvie and Robert Barker for their help with the talkgroups. Long-time friend Bill Cherepy proofread the article and pointed out items that made sense to fellow Austinites like myself, but not the rest of the country. I'd also like to offer a big thanks to Lindsay Blanton for maintaining the Trunked Radio Database. It's an invaluable resource to us all.

Table 1. Austin/Travis County TRS frequencies

Site 1:
866.1625*
866.2875*
866.7125
866.8125
866.9250
867.0875
867.1125
867.3125
867.3375
867.5750
867.6000
867.8250
867.8500
868.1000
868.1250
868.3625

868.4250
868.6250
868.6875
868.9500

Site 2:
866.1375*
866.7375
866.8375
867.1625
867.1875
867.4125
867.6375
867.6875
867.9500
868.0500
868.2750
868.3250
868.5750
868.8500

Marble Falls IR
866.8875*
867.2875
867.8000
868.1500
868.7500

Honeycomb IR
867.2625
867.7250*
868.1750
868.7750

Burleson Manor IR
867.8750
868.2250*
868.5000
868.9250

USGS Shingle IR
867.6625
867.9250*
868.4000
868.8000

Davis IR
866.8625
867.1375*
867.7750

Conventional frequencies:
866.0125 I-Call central
866.5125 I-Call 1D NE
867.0125 I-Call 2D SE
867.5125 I-Call 3D SW

868.0125 I-Call 4D NW
867.3750 Critical 1D (simplex)
867.4500 Critical 2D (simplex)

* denotes control channels
IR = Intelli-repeater
Frequencies courtesy of <http://www.trunkedradio.net>

Table 2. Austin/Travis County talkgroups

We've grown accustomed to seeing Motorola talkgroup numbers that are multiples of sixteen. The newest Motorola systems have ended this. Talkgroups can now be any integer value.

The city continues transmitting on their conventional frequencies, but should stop after the new dispatch center comes online in January 2004. The conventional frequencies are included for the benefit of those who were familiar with Austin's old system. Some VHF frequencies continue to be used and have "linked to" before the frequency.

Some talkgroups are known to exist, but the talkgroup number has not yet been reported. In such cases the talkgroup description is listed without a talkgroup number.

Austin Police Department

Talkgroup	Description
971	Dispatch Adam sector (460.100)
972	Street Response 1
973	Dispatch Baker sector (460.450)
974	Street Response 2
975	Dispatch Charlie sector (460.175)
976	Street Response 3
977	Street Response 4
978	Dispatch David sector (460.275)
979	Street Response 5
980	Dispatch Edward sector (460.325)
981	Street Response 6
982	Street Response 7
983	Dispatch Frank sector (460.400)
984	Street Response 8
985	Street Response 9
986	Dispatch George sector (460.475)
987	Street Response 10
988	Dispatch Henry sector (460.500)
989	Street Response 11
990	Dispatch Ida sector (460.025)
991	Special events
992	RAT
993	STEP 1 Traffic Enforcement
994	STEP 2 Traffic Enforcement
995	STEP 3 Traffic Enforcement
996	License & Weight
997	Motors
1000	Crit 1
1001	Crit 2
1002	Training 1
1003	Training 2
1004	Training 3
1005	Criminal Intelligence Bureau 1
1006	Criminal Intelligence Bureau 2
1007	Criminal Intelligence Bureau 3
1008	Criminal Intelligence Bureau 4 Traffic Office
1009	Criminal Intelligence Bureau 5
1010	Criminal Intelligence Bureau 6
1011	Criminal Intelligence Bureau 7
1012	Criminal Intelligence Bureau 8
1013	Criminal Intelligence Bureau 9
1014	Criminal Intelligence Bureau 10
1015	Criminal Intelligence Bureau 11
1016	Criminal Intelligence Bureau 12
1017	Criminal Intelligence Bureau 13
1018	Criminal Intelligence Bureau 14 Surveillance



1019	Organized Crime Division OCD 5
1028	Homeland Defense 1
1029	Homeland Defense 2
1390	Red A/4
1391	Red B/5
1392	Red C/6
1393	Red D/8
1394	Red E/8
1521	Aviation Police 1
1522	Aviation Police 2
1523	Aviation Police Investigations
3396	Interoperations A
3397	Interoperations B
3398	Interoperations C
3399	Interoperations D
3400	Interoperations E
3401	Interoperations F
3402	Interoperations G
3403	Interoperations H
3416	Law 1
3417	Law 2
3418	Law 3
3419	Law 4
3420	Law 5
603	Fleet Maintenance

Austin City Marshal

Talkgroup	Description
1546	Channel 1
1547	Channel 2
1548	Channel 3

Travis County Sheriff's Office (TCSO)

Talkgroup	Description
2306	Jail
2307	Jail
2308	Jail
2309	Jail
2403	Baker (154.085)
2404	Charlie
2405	Adam (155.310)
2406	David
2407	East TAC
2408	West TAC
2409	SWAT 1
2410	SWAT 2
2411	Events 1
2412	Events 2
2414	Dive/Lake
2422	Courthouse

Travis County Constable

Talkgroup	Description
2551	Constable (154.845)
2553	Constable
2558	Constable Precinct 1
2559	Constable Precinct 1
2576	Constable Precinct 2
2577	Constable Precinct 2 TAC 1
2601	Constable Precinct 3
2602	Constable Precinct 3 TAC 1
2603	Constable Precinct 3 TAC 2
2626	Constable Precinct 4
2651	Constable Precinct 5
2652	Constable Precinct 5 TAC 1
2654	Constable Precinct 5 TAC 2



Pflugerville Police Department

Talkgroup	Description
3177	Channel A
3178	Channel B
3179	CID
3180	TAC 1
3181	TAC 2

Mustang Ridge Police Department

Talkgroup	Description
2986	TAC

MRPD is dispatched by TCSO

Austin Park Police

Talkgroup	Description
271	Channel 1
275	Channel 2

Austin Fire Department

Talkgroup	Description
1122	Alarm 5 (453.450)
1371	Firecom 1/Blue-1
1372	Firecom 2/Blue-2
1373	Firecom 3/Blue-3
1374	Firecom 4/Blue-4
1375	Firecom 5/Blue-5
1376	Firecom 6/Blue-6
1377	Firecom 7/Blue-7
1378	Firecom 8/Blue-8 Airport
1379	Firecom 9/Blue-9
1380	Firecom 10/Blue-10
1381	Firecom 11/Blue-11
1382	Firecom 12/Blue-12
1383	Firecom 13/Blue-13
1384	Firecom 14/Blue-14
1385	Firecom 15/Blue-15
1386	Firecom 16/Blue-16
1403	Firenet (linked to 153.950)

Austin/Travis County EMS

Talkgroup	Description
1221	EMS Dispatch (462.975)
1222	EMS Medcom North
1223	EMS Medcom Central
1224	EMS Medcom South
1225	EMS Medcom West
1230	EMS Event 1
1231	EMS Event 2
1232	EMS Event 3
1244	Seton Southwest Hospital
1245	Seton Northwest Hospital
1246	St. David's Hospital
1247	North Austin Hospital
1248	South Austin Hospital
1249	Heart Hospital of Austin
1250	Brackenridge Crash
1251	Brackenridge Treatment
1252	Brackenridge Pediatric
1253	Brackenridge Labor & Delivery
1254	Seton Hospital
1262	Emergency



1264	EMS County (linked to 155.715)
	Red 4 (Mass Casualty)
	Red 5 (Mass Casualty)
	Red 6 (Mass Casualty)
	Red 7 (Mass Casualty)

Austin Water & Wastewater Department

Talkgroup	Description
4	Water/Wastewater
6	Water/Wastewater
7	Water/Wastewater
8	Water/Wastewater
9	Water/Wastewater
11	Water/Wastewater
12	Water/Wastewater
13	Water/Wastewater
19	Water/Wastewater
24	Water/Wastewater
32	Water/Wastewater

Austin Energy

Talkgroup	Description
155	Electric Dispatch

Austin City Services

Talkgroup	Description
253	Park Operations Common
255	Park Maintenance
258	Deep Eddy Pool
259	Emma Long Park
260	Walnut Creek Park
261	Garrison Park & Golf Athletics
262	Lake Walter E. Long
263	Fiesta Gardens

264	Zilker Park
266	Parks Aquatics
267	Recreation Center
268	Nature Trail
273	Park Events 1
274	Park Events 2
428	Convention Center
429	Convention Center
430	Convention Center
432	Convention Center
433	Convention Center
434	Convention Center
435	Convention Center
436	Convention Center
438	Convention Center
442	Convention Center
581	Street & Bridge
589	Street & Bridge
601	Service Center (Vehicle Equipment Service)
632	Libraries
646	Animal Control Dispatch
647	Animal Control TAC
648	Code Enforcement

Austin-Bergstrom International Airport

Talkgroup	Description
1476	ABIA Operations
1478	ABIA Security
1479	ABIA Maintenance
1482	ABIA Operations

Austin ISD Talkgroups

Talkgroup	Description
3076	Police
3077	Police North
3078	Police Central
3079	Police South
3080	Police TAC 1
3091	Police TAC 2
3082	Alarm Maintenance
3086	Buses
3089	Buses
3095	Maintenance
3097	Maintenance
3100	Maintenance
3104	Unknown

Travis County Parks Department

Talkgroup	Description
1902	TNR Service 1
1903	Channel 1 - Comanche
1904	Channel 2 - Hamilton Pool
1905	Channel 3 - Mansfield
1906	Channel 4 - Pace Bend
1907	Channel 5
1908	Channel 6
1911	TNR Channel

Travis County Government

Talkgroup	Description
2332	Office of Emergency Management
2336	HAZMAT

University of Texas at Austin

Talkgroup	Description
2976	UTPD Channel 1 - Operations
2977	UTPD Channel 2
2978	UTPD Channel 3
2979	Events 1
2980	Events 2
2981	Events 3
2984	LBJ Library & Museum
2990	Systems
2993	UT Parking and Traffic

LCRA Rangers

Talkgroup	Description
3426	Rangers
3427	Dispatch

Courtesy of <http://www.trunkedradio.net>, Wes Ogilvie, and Robert Barker



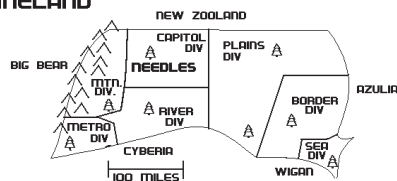
How Wide Area VHF Radio Systems Work

By Dan Yemiola, AI8O

When a public safety agency has operations that cover a wide area, like the State Police, it soon finds that one base station (which is usually located in the state capital) will not suffice.

In our hypothetical example below, State Police mobiles on the fringes of the State of Pineland cannot communicate with the state capitol at Needles.

PINELAND

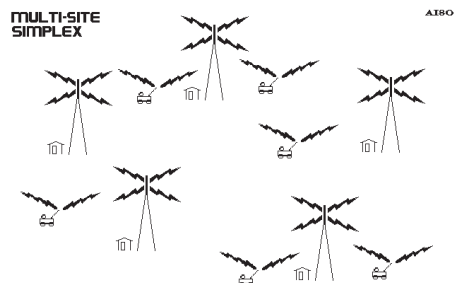


The first way to ensure adequate area-wide radio coverage is to divide the entire area into several different territories, and establish dispatch centers around the state.

Each dispatch center is responsible for an area called a radio zone.

Each radio zone has its own base radio station, and the mobile units assigned to a dispatch center usually have one or more blocks of unique unit numbers assigned to the radio zone. These unique unit numbers allow the dispatchers to quickly "hear" radio traffic from units that belong to their radio zone.

This configuration is called: MULTI SITE SIMPLEX



In this type of system every base and mobile shares the same radio frequency and every unit can hear every other unit and base station within range.

This simplex configuration has one advantage, which is also its major drawback: radio zone base stations can communicate directly with each other by merely calling another radio zone base station as if it were just another mobile, but base stations with their superior antenna systems also hear a lot of radio traffic from nearby base stations and other base station's mobiles that is not directed to them.

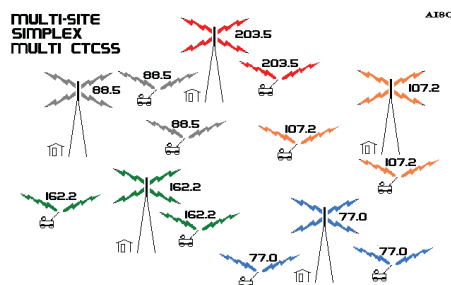
Dispatchers have to waste a lot of time listening to radio traffic, most of which does not concern them. This diverts the dispatcher's

time and attention from other important tasks.

To reduce the amount of unwanted radio traffic heard from other radio zones, a "Continuous Tone Coded Selective Squelch" (CTCSS) is installed in each base and mobile transmitter of the radio system.

CTCSS is a system of standardized, very stable, sub-audible tones that are added into the regular audio signal transmitted by a radio. If a radio with CTCSS receives a signal that does not have the proper CTCSS tone, it will not open the audio squelch, and no sound will come out of loudspeaker.

Each radio zone has its own unique CTCSS tone.



One drawback with multi-site simplex multi-CTCSS systems is that since *all* units share just one radio frequency, neighboring radio zone base stations and mobiles won't hear each other's traffic, but they will still interfere with each other. This means that as the amount of radio traffic in the *entire* system increases, interference increases and system throughput decreases.

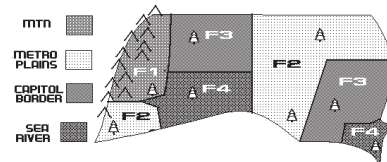
Eventually, the amount of radio traffic increases to such a point that only one unit in the entire system can transmit and be heard by its associated base station at a time, and more and more messages are delayed, garbled, or even lost completely.

To reduce interference between base stations, neighboring radio zones are placed on different (discrete) radio frequencies. Because the numbers of radio frequencies are limited, the FCC will not license a large number of radio frequencies to one user agency. This means that the same radio frequency will have to be used in more than one radio zone. The number of radio frequencies that the FCC will license is just enough so that radio zones that border each other will *not* use the same radio frequency. Also, usually when a wide area radio system becomes this sophisticated, an additional discrete radio frequency is licensed on a statewide basis to be used as a "TAC" or "Common" or "Inter Zone" channel.

This type of system is known as: SIMPLEX MULTI FREQUENCY.

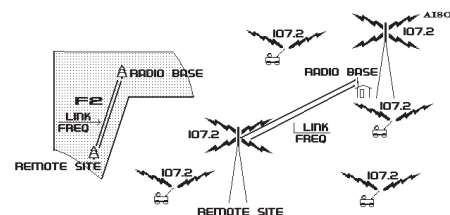
Sometimes even after wide area radio sys-

PINELAND STATE POLICE RADIO FREQUENCY ZONES

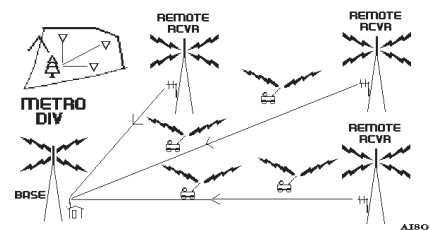


tem radio zones are established, there are still "dead areas" in various parts of a radio zone. These can be due to any one of a number of factors: The radio zone is still too big and parts of the radio zone are over the radio horizon, mountains are in the way, or big buildings in a city block the radio signals. Since subdividing radio zones and establishing new dispatch centers is not an economical or effective response, several different solutions are used.

In areas where neither the radio zone base station nor the mobiles can hear each other, an unmanned remote base is established. It consists of a transmitter/receiver on a standard radio zone frequency, and a remote link transmitter/receiver operates in a different frequency band (typically this is microwave frequency). This kind of remote base is very similar to a hemi-duplex repeater.



In areas where radio zone base stations cannot hear the mobiles but the mobiles can hear the base station, an unmanned remote receiver site is installed. It consists of a receiver only on the standard frequency for the radio zone and a remote link transmitter on another frequency that transmits back to the radio zone base station.



Some wide area radio systems can be quite complex, combining remote bases and remote receivers, and sometimes even having radio zones that have multiple sets of remote receivers linked to remote bases that are linked in turn to radio base stations.

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Homeland Air Force:

Monitoring Southern California Combat Air Patrols

By Laura Quarantiello

Combat Air Patrol (CAP): An aircraft patrol provided over an area for the purpose of intercepting and destroying hostile aircraft before they reach their targets.

When American Airlines Flight 175 slammed into the World Trade Center on September 11, 2001, it was eight minutes from being intercepted by two armed fighter jets. The F-15s, scrambled from Otis Air National Guard Base in Falmouth, Massachusetts, were 71 miles away when Flight 175 impacted the South Tower. 22 minutes later, NORAD sent two F-16s from Langley Air Force Base to intercept American Flight 77. They were 12 minutes away when the 767 crashed into the Pentagon. It was a tale of too little, too late.

At the time of the attacks, only seven locations in the United States had Air National Guard fighters on ready alert, set to lift off in less than 15 minutes. This was in stark contrast to the stateside fighter status during the Cold War when more than 100 locations had fighter jets on the runways. The seven alert locations, at bases located around the perimeter of the US, were selected to protect the nation from external threats. No one could ever conceive that the threat might come from within.

Within hours of the September 11th attacks, combat air patrols under the direction of the North American Aerospace Defense Command (NORAD) took to the air over every major city in the United States. It was the first time since the Cuban Missile Crisis that armed jet fighters were launched to protect America. The jets were ready to identify, challenge, divert, escort, force to land or shoot down any aircraft that did not follow instructions. The CAP flights, conducted mostly by Air National Guard units, continued until April 2002 when they were scaled back to what the Air Force calls a “tiered approach” based on current threats and intelligence, as well as available resources.

Since September 11th, the number of alert bases in the US has been increased to approximately 26 (the number fluctuates according to threat levels), with up to four ANG fighters at each base standing ready alert. CAP missions – though no longer continuous – fly mostly in

response to local events or intelligence assessments of potential threats. The irregular patrols are designed so that enemies can never know exactly when or where flights will be, but Air Force officials say most of these flights occur over large urban centers, major events, or in areas where the President or other dignitaries are traveling.

On the West Coast, a major hub for CAP activity has been Southern California. With 35 million people, numerous airports, several amusement parks, nuclear facilities, military installations, high rise buildings, and busy seaports, the area is considered a high value target for terrorism.

On September 11th, when the FAA grounded all air traffic in the United States, aviation listeners used to hearing communications from the routine ebb and flow of operations at Southern California’s airports were stunned at the silence. Both civilian and military frequencies were quiet. CAP flights became the only game in town for military monitors, as there was literally nothing else flying.

Within hours of the attacks, F-16s from the 144th Fighter Wing of the California Air National Guard were airborne, providing air defense protection for California from the Mexican border to Ukiah. NORAD frequencies that had previously seen little or no activity suddenly became active with the voices of fighter pilots patrolling the airspace above Los Angeles and San Diego. There were no quips or casual exchanges over the airwaves: these pilots were flying fully armed fighters and were ready to act to protect California’s citizens from harm. Many listeners reported that the tone and content of the communications were unlike anything they had ever heard before.

Several frequencies emerged as “must-



F16 photo courtesy of DoD

haves” for local listeners: **364.2**, **271.0**, and **282.6** handled the bulk of communications between BIGFOOT (NORAD Western Air Defense Command, using several changeable call signs) and the fighters. In addition, several VHF frequencies served as air to air channels between the jets (see frequency list) and provided interesting insight into operations.

Because fighters are thirsty beasts, the CAPs were often refueled in midair by tankers and these communications occurred either on the primary UHF frequency or a secondary NORAD channel. Not everything was in the clear, however, as the pilots frequently “went secure,” using Have Quick radios for encrypted transmissions. The data bursts kept casual lis-

teners out of the loop, but provided much-needed communications security for the CAP flights. Once regular air traffic resumed, the CAP jets also began coordinating operations with the Los Angeles Air Route Traffic Control Center, usually on **119.95** and **277.4**.

The first CAP flights over Southern California were flown by the 144th Fighter Wing of the state's Air National Guard, launching from March ARB and Fresno ANGB. Patrols have since been supplemented by ANG units from Montana, Arizona, and Nevada, as well as regular Air Force units. Call signs of CAP flights vary with the unit and also can change with the mission (see call sign list).

Continuous CAP flights over Los Angeles and the surrounding area remained in place until around April of 2002, when the Air Force moved to a random patrol posture. Officials cited the strain on crews, support personnel, and planes as the reason for the cut back, as well as due to a reduced domestic threat. Random patrols continued, however, and are still in place today.

Though the CAP flights over Los Angeles, San Diego and surrounding cities occur randomly, at any time of the day or night, there are certain things that step up the patrol pace. For instance, in December 2003, just days before Christmas, combat air patrols over LA were increased in response to the raising of the nation's terror alert level to Orange because of information of a pending attack on Los Angeles. Intelligence information concerning suspicious passengers caused Air France to cancel six Christmas Eve flights from Paris to Los

Angeles International. When Air France flights resumed, two fighter jets were on hand to escort them to touchdown. A week later, on New Year's Eve, Aeromexico's Flight 490 to LAX was cancelled when U.S. officials told Mexico that the flight would be denied landing rights due to security concerns. In the following days, CAP jets shadowed Flight 490 as it entered US airspace until it landed at LAX.

The events of 9/11 changed the way this country protects its domestic airspace. Fighter jets are geared up to launch on short notice from multiple locations and random CAP patrols watch over major cities, ready to intercept wayward airliners or other airborne threats. If the tragedy of 9/11 taught us anything, it taught us that we must be armed and ready in the skies. Hopefully, our military jets will never again be in a situation where it's too little, too late.



F16s on a CAP flight, courtesy DoD

NORAD WESTERN AIR DEFENSE CAP FREQUENCIES

138.150	Air to Air
138.225	Air to Air
138.400	Air to Air
138.675	Air to Air
139.925	Air to Air
142.375	Air to Air
148.125	Air to Air
282.600	Blue 17
252.000	Blue 11

260.800	
265.400	White 2
271.000	Blue 15
288.400	Blue 19
295.800	Blue 20
300.125	Blue 40
321.300	Blue 60/Amber 6
364.200	Blue 7

CALIFORNIA CAP CALL SIGNS

ALEXIA	194th FS, California ANG [F-16]
BANYAN	27th FS, Langley AFB, VA [F-15]
BLUTO	162nd FW, Arizona ANG [F-16]
CATS	162nd FW, Arizona ANG [F-16]
DOGS	120th FW, Montana ANG [F-16]
GRIZZLY	163rd ARW, California ANG [KC-135R]
GOLIATH	552nd ACW, Tinker AFB, OK

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MAGIC	186th FS, Montana ANG [F-16]
NORA	194th FS, California ANG [F-16]
RUBBER	196th ARS, California ANG [F-16]
TACO	150th FG, New Mexico ANG [F-16]
TRICK	57th FW, Nellis AFB, NV [F-15]
TANKER	196th ARS, California ANG [KC-135R]
VALLEY	194th FS, California ANG [F-16]

COMMON CAP BREVITY CODES

ALPHA CHECK - Request for or confirmation of bearing and range to a point.

ANCHOR (ANCHORED) - Orbit about a specific point; refueling track flown by tanker.

AUTHENTICATE - To request or provide a response for a coded challenge.

BANDIT - An aircraft identified as enemy.

BEAM(ING) - Target stabilized within 70 to 110 degree aspect; generally given with cardinal directions: east, west, north, or south.

BINGO - Fuel state needed for recovery.

BOGEY DOPE - Request for target information as briefed.

BOX - Groups/contacts/formations in a square or offset square.

BRAA - Tactical control format providing target bearing, range, altitude, and aspect, relative to a friendly aircraft.

BREAKAWAY - Tanker or receiver directive call indicating immediate vertical and nose/tail separation between tanker and receiver is required.

BULLSEYE - An established point from which the position of an object can be referenced; made by cardinal/range or digital format.

CAP/CAPPING - Directive call to establish an orbit at a specified location.

CHECK - Turn degrees left or right and maintain new heading.

CLEAN - No radar contacts on aircraft of interest.

COLD - On a leg of the combat air patrol (CAP) pointed away from the anticipated threats; also group heading away from friendly aircraft.

DECLARE - Inquiry as to the identification of a specified track(s), target(s), or correlated group.

FENCE (IN/OUT) - Set cockpit switches as appropriate prior to entering/ exiting the combat area.

FLANK(ING) - Target with a stable aspect of 120 to 150 degrees.

GADGET - Radar or emitter equipment.

GO ACTIVE - Go to briefed Have Quick net.

GO CLEAR - Use unencrypted voice communications.

GO SECURE - Use encrypted voice communications.

GROUP - Radar targets within approximately 3 nautical miles of each other.

GUNS - An air-to-air gunshot.

HEAD - Target with an aspect of 160 to 180 degrees.

HEADS UP - Alert of an activity of interest.

HOLDING HANDS - Aircraft in visual formation.

HOME PLATE - Home airfield or carrier.

JOKER - Fuel state above bingo at which separation/bugout/event termination should begin.

JUDY - Aircrew has radar/visual contact on the correct target, has taken control of the intercept, and only requires situation awareness information. Controller will minimize radio transmissions.

LEAD-TRAIL - Tactical formation of two contacts within a group separated in range or following one another.

MERGE - Information that friendlies and targets have arrived in the same visual arena; Call indicating radar returns have come together.

MICKY - Have Quick time synchronization signal.

NAKED - No RWR indications.

NEW PICTURE - Used by controller or aircrew when tactical picture has changed. Supersedes all previous calls and re-establishes picture for all players.

NO FACTOR - Not a threat.

PARROT - IFF transponder.

PICTURE - Provide tactical situation status pertinent to mission.

PLAYMATE - Cooperating aircraft.

PLAYTIME - Amount of time aircraft can remain on station.

POGO - Switch to communication channel number preceding POGO. If unable to establish communications, switch to channel number following POGO. If no channel number follows POGO, return to this channel.

POSIT - Request for position; response in terms of a geographic landmark, or off a common reference point.

PRESS - Directive to continue the attack; mutual support will be maintained. Supportive role will be assumed.

PUSH - Go to designated frequency.

RESET - Proceed to a prebriefed position or area of operation.

SHOOTER - Aircraft designated to employ ordnance.

SNAP - An immediate vector to the group described.

SORT - Directive to assign responsibility within a group; criteria can be met visually, electronically (radar), or both.

SOUR - Equipment indicated is not operating

SQUAWK - Operate IFF as indicated.

STATUS - Request for tactical situation.

STRANGER - Unidentified traffic that is not associated with the action in progress.

SWEET - Equipment indicated is operating efficiently.

WORDS - Directive or interrogative regarding further information or directives pertinent to mission.



KC135 on a refueling run, courtesy DoD

Propagation Outlook for the Spring Season

By Tomas Hood NW7US

As we move into spring in the Northern Hemisphere, the characteristics of shortwave radio propagation changes. Paths begin opening up between more distant locations, especially between the northern and southern hemispheres. This is because during the spring season the sun is mostly overhead over the equator, creating mostly equal day and night periods in both hemispheres.

The Vernal Equinox on March 20, 2004, marks the day when the hours of daylight and darkness are about equal around the world. This creates an ionosphere of similar characteristics throughout more of the world than is possible during other times when it is summer in one hemisphere and winter in the other and there are extreme differences in the ionosphere. This equalization of the ionosphere which takes place during the equinoctial periods (autumn and spring) is responsible for optimum DX conditions, and starts late in February and lasts through May.

Spring is also the season of aurora. Geomagnetic storms that ignite auroras occur more often during the months around the equinoxes during early autumn and spring. This seasonal effect has been observed for more than 100 years. Scientists are still puzzled about all of the reasons, but they have a wealth of research from which they've developed models to help understand the phenomena.

As the Sun rotates (one full rotation occurs about every 27 days), the plasma spewing out from the Sun forms into a spiral shape known as the "Parker Spiral" (named after the scientist who first described it). This solar wind carries with it an interplanetary magnetic field, which ever expands away from the sun in this spiral. Think of one of those rotating lawn sprinklers with jets of water shooting away from the center. You can see a bending or curving of the water lines.

As the Earth moves around the Sun, these spiraling solar winds sweep into Earth's magnetosphere. How the magnetic field lines of the Interplanetary Magnetic Field (IMF) in the solar wind interact with the magnetic field lines of the Magnetosphere is the key to geomagnetic storms and aurora. At the Magnetopause (the part of our planet's Magnetosphere that fends off the solar wind), Earth's magnetic field lines point north.

If the IMF tilts south it can partially cancel Earth's magnetic field at the point of contact. This causes the two magnetic fields (Earth's and the IMF) to link (think of how two magnets link with one magnet's south pole connecting with the other's north pole), creating a magnetic field line from Earth directly into the solar wind riding

the Parker Spiral. What results is an opening of a window through which plasma from the solar wind can reach Earth's inner atmosphere, bombarding the gasses of the upper regions.

Earth's magnetic dipole field lines are most closely aligned with the Parker spiral in April and October. If the sun is highly active at the same time, we witness spectacular aurora, while also experiencing a lot of geomagnetic storms. During times when there are many flares with associated coronal mass ejections (big plasma clouds that are blown away from the sun, out into the solar wind stream) the open window of the magnetosphere allows this extra plasma in, causing active aurora. Coronal holes also release large, steady streams of plasma out into the solar wind. This is why aurora is most likely and strongest during the equinoctial months, and during the peak years of the solar cycle they tend to occur quite often.

Will we see a lot of aurora during the spring of 2004? Each solar cycle tends to have two peak periods of geomagnetic activity in its eleven-year cycle. The second peak is always a stronger, more intense period where we witness frequent coronal holes, coronal mass ejections, and strong flare activity. We are well into the decline phase of Solar Cycle 23, and may have finally passed the second geomagnetic activity peak of this cycle. However, I expect a moderate to high level of solar activity that may continue to keep the geomagnetic field at active to minor storm levels. If so, this will fuel a fair amount of aurora during April. And for VHF weak signal enthusiasts, this could mean an active radio aurora season.

What is the Aurora?

Aurora is a direct result of solar plasma interacting with gasses in the upper atmosphere. It is common to see aurora during active to severe geomagnetic storms. The magnetosphere is filled with electrons and protons that are normally trapped by lines of magnetic force that prevent them from escaping to space or descending to the planet below. The impact of a large, fast-moving plasma cloud breaks loose some of those trapped particles, causing them to rain down on the atmosphere. Gasses in the atmosphere start to glow under the impact of these particles.

Different gasses give out various colors. Think of a neon sign and how the plasma inside the glass tube, when excited, glows with a bright color. These precipitating particles mostly follow the magnetic field lines that run from Earth's magnetic poles, and are concentrated in circular regions around the magnetic poles called "au-

roral ovals." These bands expand away from the poles during magnetic storms. The stronger the storm, the greater these ovals will expand. Sometimes they grow so large that people even at middle latitudes, like California, can see these "Northern Lights."

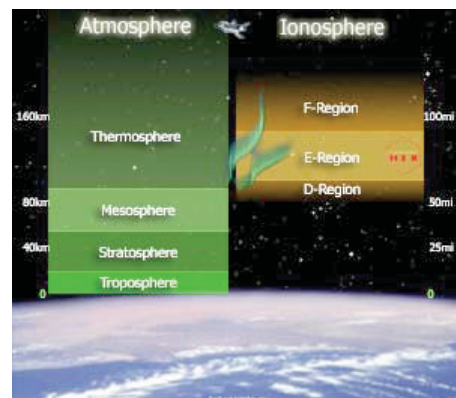
Look for aurora-mode propagation when the planetary K index (Kp) (the K index is a measurement of the geomagnetic activity of the Earth's magnetic fields) rises above 5, and look for visual aurora after dark when the Kp rises above 6. The higher the Kp, the more likely visual lights may be seen.

But, you don't have to see them to hear their influence on propagation. Listen for stations from over the poles that sound raspy or fluttery. Look for VHF DX. Sometimes it will enhance a path at certain frequencies, other times it will degrade the signals. Sometimes signals will fade quickly, then come back with great strength. The reason for this is that the radio signal is being refracted off of the more highly ionized areas that are lit up. These ionized areas ebb and flow, so the ability to refract changes, sometimes quickly. I've observed the effect of aurora and associated geomagnetic storminess even on lower HF frequencies.

If you are interested in aurora, I have many links to the topic at my propagation web page, <http://prop.hfradio.org>. To view photographs and movies of aurora, check out <http://www.auroraexperience.com/>

Radio Aurora

If there are enough solar particles flowing down the earth's magnetic field lines and colliding with atmospheric atoms and molecules, ion-



"Aurora occurs mostly in the E Layer of the Ionosphere, which is located in the Thermosphere. The E Layer is also where Sporadic-E ionization occurs." Graphic courtesy of "Project HEX (Horizontal E-region eXperiment)"

ization occurs. This ionization may be sufficient to reflect VHF and lower UHF radio waves, generally between 25 and 500 MHz. This usually occurs in conjunction with visual aurora, but the mechanism is a bit different and it is possible to have one (visual or radio) without the other.

Using radio aurora, the chances of contacting stations over greater distances than would ordinarily be possible on the VHF frequencies are increased. Like its visual counterpart, radio aurora is very unpredictable. The thrill of the chase draws many VHF weak signal DXers to working auroral DX.

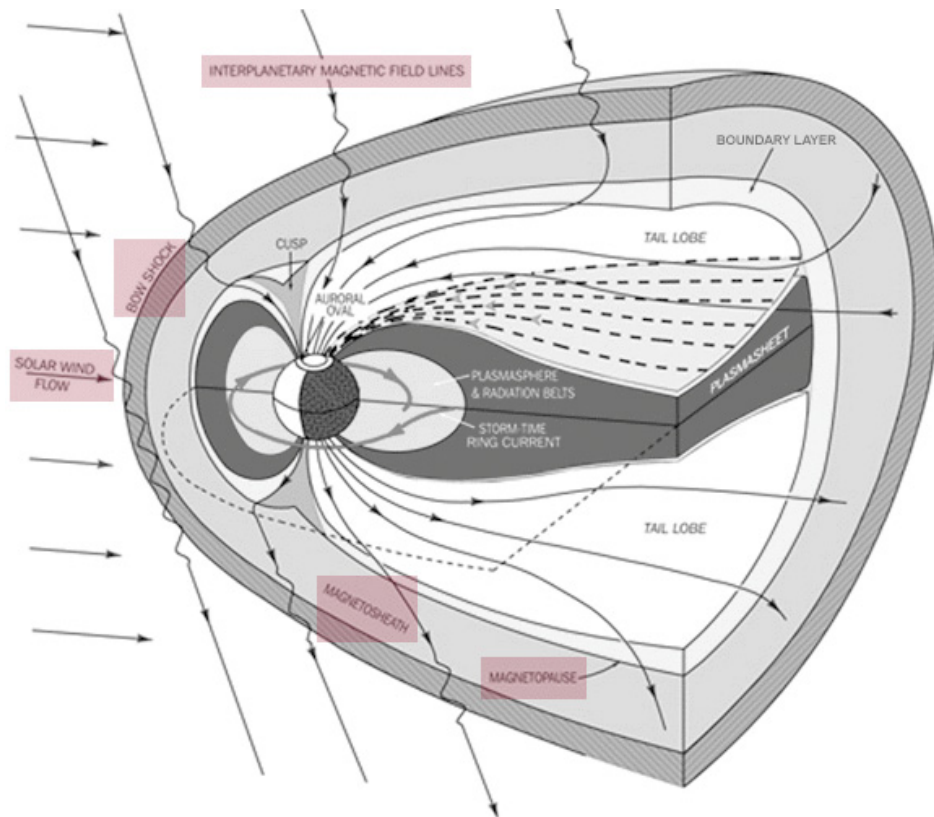
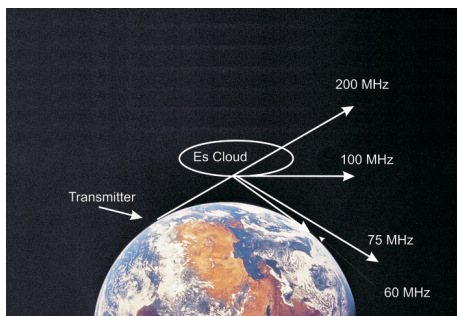
VHF auroral echoes, or reflections, are most effective when the angle of incidence of the signal from the transmitter, with the geomagnetic field line, equals the angle of reflection from the field line to the receiver. Radio aurora is observed almost exclusively in a sector centered on magnetic north. The strength of signals reflected from the aurora is dependent on the wavelength when equivalent power levels are employed. Six-meter reflections can be expected to be much stronger than 2-meter reflections for the same transmitter output power. The polarization of the reflected signals is nearly the same as that of the transmitted signal.

The planetary K index is a good indicator of the expansion of the auroral oval, and the possible intensity of the aurora. When the Kp is higher than 5, most readers in the northern states and in Canada can expect favorable aurora conditions. If the K index reached 8 or 9, it is highly possible for radio aurora to be worked by stations as far south as California and Florida. Your magnetic latitude can be found using the map at <http://www.sec.noaa.gov/Aurora/globeNW.html>.

Sporadic-E

As we move from April to May, and into June, long distance VHF and sometimes UHF propagation opens up by a mostly summer-time phenomenon called, "sporadic-E." Sporadic-E (Es) is the term given to the mode of propagation where clouds of highly dense ionization develop in the E layer of the Ionosphere. These clouds might be very small, but regardless of their size, they seem to drift and move about, making the propagation off of these clouds short and unpredictable. It is well documented that Es occurs most often in the summer, with a secondary peak in the winter. These peaks are centered very close to the solstices. The winter peak can be characterized as being five to eight times less than the summer Es peak.

We do not yet fully understand the causes of sporadic-E. Scientists are still pursuing the cause or, more likely, the multiple causes of spo-



A wide-angle view illustrating the solar wind/magnetosphere interaction. Graphic courtesy of NASA/IMAGE

radic-E. As far back as 1959 ten distinct types of sporadic-E and at least nine different theories of causation were offered. The classification of distinct types has been retained, but since the 1960s, the wind shear theory has become one of the most accepted theories.

Wind shear occurs when the wind blows at different directions and speeds as you increase with height. Simply put, the wind shear theory holds that gaseous ions in the E layer are accumulated and concentrated into small, thin, patchy sheets by the combined actions of high-altitude winds and the earth's magnetic field. The resulting clouds may attain the required ion density to serve as a reflecting medium for VHF radio waves.

Although most research has confirmed a close association between wind shear and sporadic-E, not all aspects of the sporadic-E phenomenon can be explained, including its diurnal and seasonal variations.

During periods of intense and wide-spread sporadic-E ionization, two-hop openings considerably beyond 1400 miles should be possible on 6 meters. Short-skip openings between about 1200 and 1400 miles may also be possible on 2 meters.

How can we know when a sporadic-E opening is occurring? Several e-mail reflectors have been created to provide an alerting service using e-mail. One is found at <http://www.gooddx.net/> and another at <http://www.vhfdx.net/sendspots/>. These sporadic-E alerting services rely on live reports of current activity on VHF. When you begin hearing an opening, you send out details so that everyone on the distribution will be alerted that something is happening. They, in

turn, join in on the opening, making for a high level of participation. Of course, the greater number of operators on the air, the more we learn the extent and intensity of the opening. The bottom-line is that you cannot work sporadic-E if you are not on the air when it occurs.

In addition to live reporting, there is a very powerful resource available on the Internet. Check out <http://superdarn.jhuapl.edu/>. SuperDARN (Super Dual Auroral Radar Network) is an international radar network for studying the Earth's upper atmosphere and Ionosphere. Using the SuperDARN real-time data twenty-four hour overview, you can view the day's ionization activity at the northern polar region. You may also view live radar displays of the same area. These graphs help identify Es clouds existing in the higher latitudes. One use for this would be the detection of a variation of Es, known as Auroral-E.

Michael Hawk has written an informative overview of sporadic-E. You may read it online at <http://www.amfmdx.net/propagation/Es.html>.

Meteor Showers?

April has one major meteor shower that may provide VHF weak signal propagation. The April Lyrids meteor shower occurs from April 16 to 22, peaking on the UTC night of April 21, 2004, at about 2250 UTC. The hourly visual meteor rate is expected to be about 15, with average meteor velocities of about 48 kilometers per second with broad outbursts. While this shower peaks at about 10 to 15 visual meteors per hour (ZHR), or about one per every five minutes on average, radio bursts occur more often from smaller meteors.

The debris expelled by comet Thatcher as it moves through its orbit causes the Lyrids. It is a long period comet that visits the inner solar system every 415 years or so. Despite this long period, there is activity every year at this time, so it is theorized that the comet must have been visiting the solar system for quite a long time. Over this long period, the debris left with each pass into the inner solar system has been pretty evenly distributed along the path of its orbit.

This material isn't quite evenly distributed, however, as there have been some years with outbursts of higher than usual meteor activity. The most recent of these outbursts occurred in 1982, with others occurring in 1803, 1922, and 1945. These outbursts are unpredictable and one could even occur this year. The best time to work this shower should be from midnight to early morning.

The unpredictability of the shower in any given year always makes the Lyrids worth watching, since we cannot say when the next unusual return may occur. If this year's event is average or better (30 to 60 good-sized meteors entering the Earth's atmosphere every hour), this should make possible meteor-scatter type openings on the VHF bands.

Another meteor shower, the Eta Aquarids, will occur in May. The Eta Aquarids peak in the morning of May 5, but start around May 1, 2004. This shower has a peak rate of up to 20 to 50 per hour. Most meteor showers are at their best after midnight. After midnight, you're on the leading edge of the Earth and you're meeting the meteors head-on. Before midnight, you're on the trailing edge of the Earth and the meteors have to catch up to you. As a result, not only are more meteors seen in the pre-dawn hours, but their impact speeds encountering the Earth's atmosphere are much higher and the meteors are generally faster and brighter. This causes greater ionization, which is what you use to refract a radio signal. Look for TV and FM broadcasts during these events. If you are an amateur radio operator, look for 6 and 2 meter openings off of the ionized meteor trails.

June has three moderate showers, as well. The Arietids, which are active from about May 29 through June 19, peak with a ZHR of 60 on June 7, 2004. The z-Perseids start around May 20 and continue through July 7, peaking with a ZHR of 40 on June 9, 2004. The beta-Taurids will peak on June 28. Signs of most of these peaks were found in radio data from 1994-2000, though some are difficult to define because of their proximity to other sources, while the Arietid and zeta-Perseid maxima tend to blend into one another, producing a strong radio signature for several days in early June. There is a slight possibility for June Lyrids peaking on June 16, but this is uncertain. For more information, take a look at <http://www.imo.net/calendar/>. Check out <http://www.meteorscatter.net/metshw.htm> for a very useful resource covering meteor scatter and upcoming showers.

HF Propagation: April, May, and June

April is one of the most interesting months for propagation. The seasonal change plays out on HF with activity moving up from 40 meters and down from 10 meters.

Propagation on the highest shortwave bands suffers during April and the summer months due to lower MUFs (Maximum Usable Frequencies) in the Northern Hemisphere. MUFs peak very late in the day during summer. Summertime MUFs are lower due to solar heating which cause the ionosphere to expand. An expanded ionosphere produces lower ion density, which results in lower MUFs. Short path propagation between countries in the Northern Hemisphere will drop out entirely.

High-band shortwave propagation peaks in the fall. April and May are fall months in the Southern Hemisphere making long-path DX possible. Short-path propagation to South America, South Pacific, and other areas south of the equator will be strong and reliable when open. But, with the decline of the current solar cycle, solar activity is not supporting the higher HF band propagation, so don't expect a lot from the higher shortwave bands.

From April to June, fair to good propagation occurs on both daytime and nighttime paths on the middle shortwave bands. The strongest propagation occurs on paths that span areas of both day and night, following the MUF. During April, peaking in May, and still during June, the frequencies between 9 and 16 MHz may offer occasional 24-hour DX to all parts of the world. If you hear a lot of echo on a signal, you might be beamed in the wrong direction. Try the opposite azimuth. Thirty-one meters will be the most stable as a nighttime band, with propagation following grayline and nighttime paths.

Low-band propagation is still hot on 41 meters, with Europe in the evening, and Asia in the mornings. Occasional DX openings will occur on the tropical bands around sunrise. However, these bands are quickly being degraded by the seasonal increase in noise.

June marks the changeover from equinoctial to summertime propagation conditions on the shortwave bands. Solar absorption is expected to be at seasonally high levels, resulting in generally weaker signals during the hours of daylight when compared to reception during the winter and spring months.

VHF Propagation

On VHF, the possible aurora during April, and then the increase in Sporadic-E propagation as we move into June, may produce some great long-range VHF and even possible UHF DX. At the same time, there is usually a seasonal decline in Transequatorial Propagation (TE) during the summer months, but some VHF openings may still be possible during June. The best time to catch an opening across the geomagnetic equator is between 8 and 11 p.m. local daylight time. These TE openings will be north-south paths that cross the geomagnetic equator at an approximate right angle.

The Solar Cycle Pulse

Every eleven years the activity of the Sun (as evident by the number of solar flares, coronal holes and so forth) reaches a peak called the "solar maximum." A period of quiet called the "solar minimum" occurs roughly five years later. During the solar maximum there are many sunspots, solar flares, and coronal mass ejections, all of which can

affect communications and weather here on Earth.

The current cycle, number 23, started in 1996. Cycle 21 started in June 1976 and lasted 10 years and 3 months. Cycle 22 started in September 1986 and lasted 9 years and 8 months. The current cycle started in between May and July of 1996 with a minimum of activity observed during October of 1996. Two peaks have occurred: The monthly smoothed sunspot number first peaked at 120.8 during April 2000, with a second yet lower peak at 115.6 for November 2001. After subtracting the four years from the 1996 beginning to the peak during 2000, Cycle 23 should end during the end of 2006 or during the beginning of 2007.

Solar cycle 23 was originally predicted to reach the same magnitude as cycle 21 with the monthly smoothed sunspot number reaching 160. However, Cycle 23 compares most with the past cycles 17 and 20, and to a lesser degree, with Cycle 2. Those developed much the same way, with a smooth decline over about a four-year period before reaching the minimum and ending. Check out the graphical comparison at <http://www.dxl.com/solar/cyclcomp2.html>.

The peak years of Cycle 23 were somewhat disappointing to many radio enthusiasts, since the intensity was not as high as seen in previous solar cycles. However, some very surprising VHF propagation was experienced during this cycle, compared to past cycles. Sporadic-E, Radio aurora, and intense periods of F-layer propagation during the peak years marked Cycle 23 to be memorable.

MW DXers might say that we have had dismal conditions, due to the higher planetary A index (Ap) numbers due to long-term recurring coronal hole events. VHF DXers might say that conditions were fair with some good F-layer openings, some auroral openings, and so forth. The general conditions for shortwave has been generally fair, with only short periods of unusually good conditions. We have had a high number of days with geomagnetic storminess, medium to large flare activity, and elevated solar winds. This cycle in general is much lower in activity compared with the last cycle. The unusual conditions appear as such because the rest of the time we have had long periods of marginal conditions. But, as we are moving further away from the peak of the cycle, the solar activity is declining, making for less stormy conditions.

Write Me

Do you have questions about space weather and radio propagation? Do you have observations about aurora, Sporadic-E, or Meteor Shower propagation that you would like to share? Please write me an e-mail message or a letter.

I also invite you to check out my propagation resource center on the Internet at <http://prop.hfradio.org>. If you have a cellphone or other handheld device capable of reading WML, I have a WAP version of this resource center at <http://wap.hfradio.org>. You can even sign up for my propagation eAlert service for free. These propagation eAlerts keep you informed of the various index numbers, in real-time. I wish you a happy radio-monitoring season!

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Monitoring Times Hot 1000 HF Frequencies

Compiled by Larry Van Horn, N5FPW MT Assistant Editor
Mode is Upper Sideband (USB) unless otherwise noted

2003	Marine Intership Safety and Operations Simplex Great Lakes	3056	Aero Off Route US Coast Guard Worldwide – German Navy MATELO ARCN (USB/RTTY)	3479	World Air Route Area
2065	Marine Business and Operational Simplex Nationwide	3059	Aero Off Route US Air Force Worldwide	3485	Aero South America (SAM-C/NE/SE)/Europe (EUR-A) Major World Air Route Area
2079	Marine Business and Operational Simplex Nationwide	3062	Aero Off Route US Air Force Worldwide	3494	Aero East Asia (EA-2)/Southeast Asia (SEA-2) Major World Air Route Area/North Atlantic VOLMET
2082	Marine Intership Safety and Operations Simplex Nationwide	3065	Aero Off Route US Air Force Worldwide	3497	Aero LDOC Airline Company Discrete
2093	Marine Intership Safety and Operations Simplex Nationwide	3068	Aero Off Route US Air Force Worldwide (USB/ALE) – Airborne Command Post Network <Z-100>/NIPR (Non-Secret Internet Protocol Router) Network	3900	Aero Off Route Region 1 – NATO AWACS Discrete DHN66 Geilemkirchen “Magic”
2096	Marine Business and Operational Simplex Nationwide	3071	Aero Off Route US Air Force Worldwide – Mystic Star VIP Network	3903	Aero Off Route Region 1
2142	Marine Intership Safety and Operations Simplex Pacific Coast	3074	Aero Off Route US Air Force Worldwide – Mystic Star VIP Network	3906	Aero Off Route Region 1
2182	Marine International Distress, Safety and Calling Worldwide	3078	Aero Off Route US Air Force Worldwide – Mystic Star VIP Network	3909	Aero Off Route Region 1
2203	Marine Intership Safety and Operations Simplex Gulf of Mexico	3080	Aero Off Route US Air Force Worldwide	3912	Aero Off Route Region 1
2214	Marine Intership Safety and Operations Simplex Nationwide	3083	Aero Off Route US Navy Worldwide	3915	Aero Off Route Region 1
2250	Danish Air Force Network (USB/ALE)	3086	Aero Off Route US Navy Worldwide	3918	Aero Off Route Region 1
2252	US Navy FACSAC Frequency Virginia Capes, VA “Giant Killer”	3089	Aero Off Route US Navy Worldwide – NATO AWACS Discrete DHN66 Geilemkirchen “Magic”	3921	Aero Off Route Region 1
2301	National Communications System (NCS) Nationwide	3092	Aero Off Route US Navy Worldwide – Canadian Military Aeronautical Communications System (MACS)/RAF Strike Command Integrated Communications System (STCICS)	3924	Aero Off Route Region 1
2309	US Army National Guard Nationwide (USB/ALE)	3095	Aero Off Route US Navy Worldwide – RAF Strike Command Integrated Communications System (STCICS)	3927	Aero Off Route Region 1
2326	US Federal/State Government Operation Secure Nationwide	3098	Aero Off Route US Navy Worldwide	3930	Aero Off Route Region 1
2360	US Army National Guard Nationwide (USB/ALE)	3101	Aero Off Route US Navy Worldwide – RAF Strike Command Integrated Communications System (STCICS)	3933	Aero Off Route Region 1 – Spanish Air Force Network
2371	Civil Air Patrol (CAP) Nationwide	3104	Aero Off Route US Navy Worldwide	3936	Aero Off Route Region 1
2374	Civil Air Patrol (CAP) Nationwide	3107	Aero Off Route US Navy Worldwide – French Navy Atlantic Network “Armour”/German Air Force Network	3939	Aero Off Route Region 1
2382	National Communications System (NCS) Nationwide	3110	Aero Off Route US Air Force Worldwide – RAF Strike Command Integrated Communications System (STCICS)	3942	Aero Off Route Region 1
2411	US Federal/State Government Operation Secure Nationwide	3113	Aero Off Route US Air Force Worldwide – Mystic Star VIP Network	3945	Aero Off Route Region 1
2414	US Federal/State Government Operation Secure Nationwide	3116	Aero Off Route US Air Force Worldwide – Mystic Star VIP Network/Airborne Command Post Network <Z-105>/German Navy MATELO ARCN	3950	Amateur Radio Hurricane Watch Net Worldwide (LSB) <Alternate>
2419	US Federal/State Government Operation Secure Nationwide	3119	Aero Off Route US Coast Guard Worldwide – RAF Strike Command Integrated Communications System (STCICS)	4000	Marine Simplex/Duplex (Shared) Worldwide
2422	US Federal/State Government Operation Secure Nationwide	3122	Aero Off Route US Coast Guard Worldwide – German Navy Glucksburg Rescue (USB/RTTY)	4003	Marine Simplex/Duplex (Shared) Worldwide
2439	US Federal/State Government Operation Secure Nationwide	3125	Aero Off Route US Navy Worldwide – Link 11 Voice Coordination Net/RAF Strike Command Integrated Communications System (STCICS)	4006	Marine Simplex/Duplex (Shared) Worldwide
2463	US Federal/State Government Operation Secure Nationwide	3128	Aero Off Route US Navy Worldwide – Dutch Navy PBB NAS Valkenburg	4009	Marine Simplex/Duplex (Shared) Worldwide
2466	US Federal/State Government Operation Secure Nationwide	3131	Aero Off Route US Navy Worldwide – Belgium Air Force Network <YA>/RAF Strike Command Integrated Communications System (STCICS)	4012	Marine Simplex/Duplex (Shared) Worldwide
2471	US Federal/State Government Operation Secure Nationwide	3134	Aero Off Route US Air Force Worldwide (USB/ALE) – Airborne Command Post Network <Z-110>/Special Operations	4015	Marine Simplex/Duplex (Shared) Worldwide
2474	US Federal/State Government Operation Secure Nationwide	3137	Aero Off Route US Air Force Worldwide (USB/ALE) – Scope Command ALE Network/Spanish Air Force SAR Service	4018	Marine Simplex/Duplex (Shared) Worldwide
2487	US Federal/State Government Operation Secure Nationwide	3140	Aero Off Route US Air Force Worldwide	4021	Marine Simplex/Duplex (Shared) Worldwide
2500	Time/Frequency Standard Stations WWW/WWW Ft. Collins, CO/Kauai, HI (AM)	3143	Aero Off Route US Air Force Worldwide – Airborne Command Post Network <Z-115>/German Air Force Transport Command Network	4023	Canadian Forces Affiliate Radio System (CFARS) Worldwide <Zulu>
2511	US Federal/State Government Operation Secure Nationwide	3146	Aero Off Route US Air Force Worldwide – Italian Navy	4024	Marine Simplex/Duplex (Shared) Worldwide
2518	US Navy Tactical Network Worldwide	3149	Aero Off Route US Navy Worldwide – RAF Strike Command Integrated Communications System (STCICS)	4027	Marine Simplex/Duplex (Shared) Worldwide
2520	US Army National Guard Nationwide (USB/ALE)	3152	Aero Off Route US Navy Worldwide	4030	Marine Simplex/Duplex (Shared) Worldwide
2535	US Federal/State Government Operation Secure Nationwide	3163	US Coast Guard 9th District Network (USB/ALE)	4033	Marine Simplex/Duplex (Shared) Worldwide
2562	US Navy Hurricane Contingency Support Net Gulf of Mexico	3166	US Navy Tactical Network Worldwide	4036	Marine Simplex/Duplex (Shared) Worldwide
2569	US Federal/State Government Operation Secure Nationwide	3170	US Army National Guard Nationwide (USB/ALE)/American Red Cross Disaster Network Nationwide	4039	Marine Simplex/Duplex (Shared) Worldwide
2587	US Federal/State Government Operation Secure Nationwide	3187	NASA Space Shuttle SRB Recovery Network Atlantic Ocean	4041	US Navy/Marine Corps MARS Network Nationwide
2627	US Army National Guard Nationwide (USB/ALE)	3192	NASA New Zealand Navy Worldwide	4042	Marine Simplex/Duplex (Shared) Worldwide/US Navy/Marine Corps MARS ECOM Nationwide
2635	Marine Intership Safety and Operations Simplex Worldwide	3202	US Federal/State Government Disaster/Emergency Services Network Nationwide	4045	Marine Simplex/Duplex (Shared) Worldwide
2638	Marine Intership Safety and Operations Simplex Nationwide	3236	US Navy SESEF Discrete Ediz Hook, WA	4048	Marine Simplex/Duplex (Shared) Worldwide
2658	Federal Emergency Management Agency (FEMA) FNARS Network Nationwide (USB/LSB)	3253	Interior Department Network Nationwide	4051	Marine Simplex/Duplex (Shared) Worldwide
2670	US Coast Guard Liaison/Maritime Safety Broadcast Nationwide	3274	US Army National Guard Nationwide (USB/ALE)	4052	Canadian Forces Affiliate Radio System (CFARS) Worldwide <Yankee>
2738	Marine Intership Safety and Operations Simplex Nationwide except Great Lakes	3281	Aero Flight Test Worldwide	4054	Marine Simplex/Duplex (Shared) Worldwide
2768	Royal Australian Navy Worldwide <A1>	3295	US Air Force Airborne Command Post Network Worldwide <Z-120>	4055	Transportation Department/Federal Aviation Administration (FAA) Emergency Network Nationwide
2792	US Navy SESEF discrete Point Loma, CA	3303	Transportation Department Emergency Net Nationwide	4057	Marine Simplex/Duplex (Shared) Worldwide
2801	US Federal/State Government Operation Secure Nationwide	3307	US Navy Tactical Network Worldwide	4060	Marine Simplex/Duplex (Shared) Worldwide
2804	US Federal/State Government Operation Secure Nationwide	3311	US Air Force MARS Transcontinental Network Nationwide	4101	US Navy Tactical Network Worldwide
2807	Justice/Treasury Departments Tactical Network Nationwide	3330	Time/Frequency Standard Station CHU Ottawa, ON Canada (AM)	4125	Marine Global Maritime Distress/Safety System Worldwide
2812	US Federal/State Government Operation Secure Nationwide	3341	Federal Emergency Management Agency (FEMA) FNARS Network Nationwide (USB/LSB)	4146	Marine Simplex/Duplex (Shared) Worldwide/US Transportation Command Marine Simplex <Channel 1>
2830	Marine Intership Safety and Operations Simplex Great Lakes	3345	US Army Corps of Engineers Point to Point Network Nationwide (USB/ALE) <Channel 1>	4149	Marine Simplex Worldwide
2851	Aero North Central Asia (NCA-2) Major World Air Route Area/Flight Test Worldwide	3360	Environmental Protection Agency (EPA) Point to Point Network Nationwide	4153	US Navy Tactical Network Worldwide
2854	Aero South Atlantic (SAT-2) Major World Air Route Area	3365	NASA Hurricane Contingency Support Network Atlantic Ocean	4319	Armed Forces Network (AFN) Diego Garcia Local Night
2863	Aero Pacific VOLMET	3385	NASA Point to Point Network Nationwide	4341	US Air Force Reserve Network Nationwide
2869	Aero Central East Pacific (CEP-1/2) Major World Air Route Area	3413	Aero Central East Pacific (CEP-1/2) Major World Air Route Area/Europe VOLMET	4372	US Navy FACSAC Frequency Virginia Capes, VA “Giant Killer”
2872	Aero North Atlantic (NAT-C) Major World Air Route Area	3419	Aero Africa (AFI-2) Major World Air Route Area	4375	Royal Australian Navy Worldwide <A2>
2878	Aero Africa (AFI-4) Major World Air Route Area	3443	Aero Flight Test Worldwide	4379	Canadian Forces Halifax Military Discrete Worldwide
2887	Aero Caribbean (CAR-A) Major World Air Route Area	3452	Aero Africa (AFI-1)/South Atlantic (SAT-1) Major World Air Route Area	4395	US Navy Tactical Network Worldwide
2899	Aero North Atlantic (NAT-B) Major World Air Route Area	3455	Aero Caribbean (CAR-B) Major World Air Route Area	4417	Marine Calling Frequency Worldwide Ships transmit on 4125
2932	Aero North Pacific (NP-3/4) Major World Air Route Area	3467	Aero Africa (AFI-3)/Middle East (MID-2)/South Pacific (SP-6/7) Major World Air Route Area	4426	US Coast Guard Calling/Broadcast Nationwide Ships transmit on 4134
2944	Aero South Atlantic (SAM-NW/SW)/Middle East (MID-3) Major World Air Route Area	3470	Aero Southeast Asia (SEA-1/3) Major World Air Route Area	4438	Bellcore/Power Utility Network Nationwide
2962	Aero North Atlantic (NAT-E) Major World Air Route Area	3476	Aero North Atlantic (NAT-F)/Indian Ocean (INO-1) Major	4442	US Army National Guard Nationwide (USB/ALE)
2971	Aero North Atlantic (NAT-D) Major World Air Route Area			4445	US Army National Guard Nationwide (USB/ALE)
2992	Aero Middle East (MID-1) Major World Air Route Area			4448	US Coast Guard Tactical
2998	Aero Central West Pacific (CWP-1/2) Major World Air Route Area/LDOC Common Carrier			4450	US Air Force Special Operations Europe
3004	Aero North Central Asia (NCA-3) Major World Air Route Area/Flight Test Worldwide			4466	Civil Air Patrol (CAP) Northeast/Southeast Regions
3007	Aero LDOC Airline Company Discrete			4469	Civil Air Patrol (CAP) Northeast/Southeast Regions
3010	Aero LDOC Airline Company Discrete			4472	US Air Force Airborne Command Post Network Worldwide <Z-130>
3013	Aero LDOC Airline Company Discrete			4479	Emergency Department Network Nationwide (USB/ALE)
3016	Aero North Atlantic (NAT-A)/East Asia (EA-1) Major World Air Route Areas			4490	US Government SHARES SCN ALE Network Nationwide (USB/ALE) <Channel 3>
3019	Aero North Central Asia (NCA-1) Major World Air Route Area			4495	US Air Force Airborne Command Post Network Worldwide <Z-125>
3023	Aero/Marine Search and Rescue Coordination Worldwide			4506	Civil Air Patrol (CAP) North Central Region
3026	Aero Off Route US Air Force Worldwide – RAF Strike Command Integrated Communications System (STCICS)			4509	Civil Air Patrol (CAP) North Central Region
3029	Aero Off Route US Air Force Worldwide – Mystic Star VIP Network			4517	US Army National Guard Nationwide (USB/ALE)
3032	Aero Off Route US Air Force Worldwide – Royal Australian Air Force/Royal New Zealand Air Force AOCs GPN Local Night			4528	US Navy Tactical Network Worldwide
3035	Aero Off Route US Navy Worldwide			4536	US Army National Guard Nationwide (USB/ALE)
3038	Aero Off Route US Navy Worldwide – RAF Strike Command Integrated Communications System (STCICS)/Norwegian Navy MARPAT			4540	UK Royal Air Force Architect Network Worldwide
3041	Aero Off Route US Air Force Worldwide – Space Shuttle Operations “Cape Radio”			4557	US Air Force MARS Phone Patch Network <RK>
3044	Aero Off Route US Air Force Worldwide – Special Operations Europe/French Naval Network			4560	Canadian Forces Military Maritime Command Discrete Worldwide
3047	Aero Off Route US Navy Worldwide – Canadian Military Aeronautical Communications System (MACS)			4562	US Army National Guard Nationwide (USB/ALE)
3050	Aero Off Route US Navy Worldwide			4573	US Government SHARES SCN Voice Network Nationwide (USB/ALE) <Channel 1 Alternate>
3053	Aero Off Route US Coast Guard Worldwide – Danish Air Force Network			4582	Civil Air Patrol (CAP) Middle East/Pacific Regions
				4585	Civil Air Patrol (CAP) Middle East/Pacific Regions
				4590	US Air Force MARS Transcontinental Network Nationwide
				4601	Civil Air Patrol (CAP) Great Lakes/Rocky Mountain Regions

4604	Civil Air Patrol (CAP) Great Lakes/Rocky Mountain Regions	Range	5901	Agriculture Department Network Nationwide	
4607	US Army National Guard Nationwide (USB/ALE)	5380	Interior Department Network Nationwide	5912	Justice/Treasury Departments Tactical Network Nationwide (USB/ALE)
4627	Civil Air Patrol (CAP) Southwest Region	5399	US Coast Guard Tactical	6020	US Army Corps of Engineers Point to Point Network Nationwide (USB/ALE) <Channel 6>
4630	Civil Air Patrol (CAP) Southwest Region	5400	US Army Corps of Engineers Point to Point Network Nationwide (USB/ALE) <Channel 4>	6047	US Army National Guard Nationwide (USB/ALE)
4637	US Army National Guard Nationwide (USB/ALE)/Danish Navy Network (CW)	5402	Federal Emergency Management Agency (FEMA) Point to Point Network Nationwide (USB/ALE)	6215	Marine Global Maritime Distress/Safety System Worldwide
4640	Ohio State Disaster Services Agency Statewide	5422	US Coast Guard Tactical	6224	Marine Simplex Worldwide/US Transportation Command Marine Simplex <Channel 2>
4654	Aero LDOC Airline Company Discrete	5424	US Coast Guard 9th District Network (USB/ALE)	6227	Marine Simplex Worldwide/US Transportation Command Marine Simplex <Channel 3>
4666	Aero Central West Pacific (CWP-1/2) Major World Air Route Area	5429	US Army National Guard Nationwide (USB/ALE)	6230	Marine Simplex Worldwide
4669	Aero South America (SAM-NW/SW)/Middle East (MID-1/3) Major World Air Route Area	5436	US Army Corps of Engineers Point to Point Network Nationwide (USB/ALE) <Channel 5>	6234	US Coast Guard Tactical
4675	Aero North Atlantic (NAT-D) Major World Air Route Area	5450	UK Royal Air Force VOLMET	6350	Armed Forces Network (AFN) Hawaii Local Night
4678	Aero North Central Asia (NCA-2) Major World Air Route Area	5451	Aero Flight Test Worldwide	6427	US Navy Space Warfare Command Network Nationwide
4687	Aero LDOC Airline Company Discrete	5469	Aero Flight Test Worldwide	6458	Armed Forces Network (AFN) Puerto Rico 24 Hours
4700	Aero Off Route US Navy Worldwide – Tactical Support Center (TSC) Pacific Region	5475	Aero LDOC Airline Company Discrete	6501	US Coast Guard Calling/Broadcast Nationwide Ships transmit on 6200
4703	Aero Off Route US Navy Worldwide – Canadian Military Aeronautical Communications System (MACS)/Danish Air Force/Coast Guard Network	5493	Aero Africa (AFI-4) Major World Air Route Area	6510	Royal Australian Navy Worldwide <A3>
4706	Aero Off Route US Navy Worldwide – RAF Strike Command Integrated Communications System (STCICS)	5505	Aero Europe VOLMET	6516	Marine Calling Frequency Worldwide Ships transmit on 6215
4709	Aero Off Route US Navy Worldwide – RAF Strike Command Integrated Communications System (STCICS)	5520	Aero Caribbean (CAR-B) Major World Air Route Area	6526	Aero LDOC Airline Company Discrete
4712	Aero Off Route US Navy Worldwide	5526	Aero South America (SAM-C/NE/SE) Major World Air Route Area	6532	Aero Central West Pacific (CWP-1/2) Major World Air Route Area
4715	Aero Off Route US Navy Worldwide	5529	Aero LDOC Airline Company Discrete	6535	Aero Africa (AFI-1)/South Atlantic (SAT-1) Major World Air Route Area
4718	Aero Off Route US Air Force Worldwide – RAF Strike Command Integrated Communications System (STCICS)	5532	Aero LDOC Airline Company Discrete	6556	Aero Southeast Asia (SEA-1/3) Major World Air Route Area
4721	Aero Off Route US Air Force Worldwide (USB/ALE) – Scope Command ALE Network/German Air Force Network/French Air Force-Navy/German Air Force Transport Command/Italian Navy Patrol Aircraft	5535	Aero LDOC Airline Company Discrete	6562	Aero Central West Pacific (CWP-1/2) Major World Air Route Area
4724	Aero Off Route US Air Force Worldwide – HF Global Communications System (HF-GCS) <Primary>	5538	Aero LDOC Airline Company Discrete	6571	Aero East Asia (EA-1) Major World Air Route Area
4727	Aero Off Route US Air Force Worldwide – Belgium Air Force Network	5541	Aero LDOC Common Carrier Discrete	6577	Aero Caribbean (CAR-A) Major World Air Route Area
4730	Aero Off Route US Coast Guard Worldwide (USB/ALE)	5544	Aero LDOC Airline Company Discrete	6586	Aero Caribbean (CAR-B) Major World Air Route Area
4733	Aero Off Route US Coast Guard Worldwide	5547	Aero Central East Pacific (CEP-1/2) Major World Air Route Area/LDOC Common Carrier Discrete	6592	Aero North Central Asia (NCA-2) Major World Air Route Area
4736	Aero Off Route US Navy Worldwide – Norwegian Navy MARPAT	5550	Aero Caribbean (CAR-A) Major World Air Route Area	6598	Aero Europe (EUR-A) Major World Air Route Area
4739	Aero Off Route US Air Force/US Navy Worldwide – Tactical Support Center (TSC) Atlantic/Pacific Areas/Canadian Forces SAR Network/Spanish Air Force SAR Services	5565	Aero South Atlantic (SAT-2) Major World Air Route Area	6622	Aero North Atlantic (NAT-F) Major World Air Route Area
4742	Aero Off Route US Air Force Worldwide – UK Royal Air Force Architect Network	5571	Aero Flight Test Worldwide	6628	Aero North Atlantic (NAT-E) Major World Air Route Area
4745	Aero Off Route US Air Force Worldwide (USB/ALE) – Airborne Command Post Network <Z-135>/NIPR (Non-Secret Internet Protocol Router) Network/Belgium Air Force Network <YD>/German Navy MARPAT/Italian Navy Ship-to-Shore/RAF Strike Command Integrated Communications System (STCICS)	5574	Aero Central East Pacific (CEP-1/2) Major World Air Route Area	6631	Aero Middle East (MID-1/3) Major World Air Route Area
4776	US Army National Guard Nationwide (USB/ALE)	5598	Aero North Atlantic (NAT-A) Major World Air Route Area	6637	Aero LDOC Airline Company Discrete
4821	Federal Aviation Administration (FAA) Network Nationwide/Federal Highway Administration (FHWA) Network <F-14>	5616	Aero North Atlantic (NAT-B) Major World Air Route Area	6640	Aero LDOC Airline Company Discrete
4840	Danish Air Force Network (USB/ALE)	5628	Aero North Pacific (NP-3/4) Major World Air Route Area	6643	Aero LDOC Airline Company Discrete
4857	US Army National Guard Nationwide (USB/ALE)	5634	Aero Indian Ocean (INO-1) Major World Air Route Area	6646	Aero LDOC Airline Company Discrete
4863	US Interior Department Network Nationwide	5643	Aero South Pacific (SP-6/7) Major World Air Route Area	6649	Aero Caribbean (CAR-A)/South America (SAM-NW/SW) Major World Air Route Area
4900	US Air Force Hurricane Contingency Support Net Eastern Test Range	5646	Aero North Central Asia (NCA-1) Major World Air Route Area	6665	Aero North Pacific (NP-3/4) Major World Air Route Area
4926	US Navy Tactical Network Worldwide	5649	Aero North Atlantic (NAT-C)/East Asia (EA-2)/Southeast Asia (SEA-2) Major World Air Route Area	6676	Aero South East Asia VOLMET
4952	MITRE Corporation Network Nationwide	5652	Aero Africa (AFI-2) Major World Air Route Area	6679	Aero Pacific VOLMET
4957	US Army National Guard Nationwide (USB/ALE)	5655	Aero East Asia (EA-2)/Southeast Asia (SEA-2) Major World Air Route Area	6685	Aero Off Route US Air Force Worldwide – Norwegian Navy MARPAT/Portuguese Air Force
4990	Environmental Protection Agency Point to Point Network Nationwide	5658	Aero Africa (AFI-3)/Middle East (MID-2) Major World Air Route Area	6688	Aero Off Route US Navy Worldwide – French Air Force Strategic Missions Net/Italian Navy Network/NATO AWACS Discrete DHN66 Geilemkirchen "Magic" <Secondary>/UK Royal Navy Network
4991	Justice/Treasury Departments Tactical Network Nationwide (USB/ALE)	5661	Aero Europe (EUR-A) Major World Air Route Area	6691	Aero Off Route US Navy Worldwide – Strategic Comm Wing 1 discrete <CA>/RAF Strike Command Integrated Communications System (STCICS)
4993	Armed Forces Network (AFN) Sigonella, Italy 24 Hours	5664	Aero North Central Asia (NCA-3) Major World Air Route Area	6694	Aero Off Route US Navy Worldwide – Canadian Forces Military Discrete
5000	Time/Frequency Standard Stations WWW/WWVH Ft. Collins, CO/Kauai, HI (AM)	5667	Aero Middle East (MID-1) Major World Air Route Area	6697	Aero Off Route US Navy Worldwide – TACAMO EAM Broadcast Discrete
5008	Transportation Department Emergency Net Nationwide	5670	Aero Southeast Asia (SEA-1) Major World Air Route Area	6700	Aero Off Route US Navy Worldwide – German Air Force Network/NATO AWACS Discrete DHN66 Geilemkirchen "Magic"
5015	US Army Corps of Engineers Point to Point Network Nationwide (USB/ALE) <Channel 2>	5677	Aero North Pacific (NP-3/4) Major World Air Route Area	6703	Aero Off Route US Navy Worldwide
5026	US Air Force Airborne Command Post Network Worldwide <Z-140>	5680	Aero International Search and Rescue Worldwide	6706	Aero Off Route US Navy Worldwide – Canadian Military Aeronautical Communications System (MACS)
5062	US Army National Guard Nationwide (USB/ALE)	5684	Aero Off Route US Air Force Worldwide (USB/ALE) – NIPR (Non-Secret Internet Protocol Router) Network/Canadian Forces St. Johns/Vancouver Military Discrete	6709	Aero Off Route US Air Force Worldwide
5080	US Air Force Western Missile Range "Plead Control"	5687	Aero Off Route US Air Force Worldwide – Special Operations/German Air Force Transport Command Network/Portuguese Air Force/Royal Australian Air Force/Royal New Zealand Air Force AOCs GPN Local Night	6712	Aero Off Route US Air Force Worldwide – HF Global Communications System (HF-GCS) Andrews/Croughton only <Primary>/Canadian Forces Military Discrete/French Air Force Circus Network <Marjolaine 2>
5087	US Army Material Command Nationwide	5690	Aero Off Route US Air Force Worldwide – Swedish Air Force	6715	Aero Off Route US Air Force Worldwide (USB/ALE) – Airborne Command Post Network <Z-160>/SIPR (Secret Internet Protocol Router) Network/Canadian Forces Military SAR Discrete/German Air Force Network/Spanish Air Force Network
5120	Danish Air Force Network (USB/ALE)	5693	Aero Off Route US Coast Guard/US Navy Worldwide – RAF Strike Command Integrated Communications System (STCICS)	6718	Aero Off Route US Navy Worldwide – Tactical Support Center (TSC) Pacific Area/French Naval Network
5126	US Army National Guard Nationwide (USB/ALE)	5696	Aero Off Route US Coast Guard Worldwide – Royal Australian Air Force/Royal New Zealand Air Force AOCs Military Distress	6721	Aero Off Route US Air Force/US Navy Worldwide (USB/ALE) – Scope Command ALE Network
5135	US Federal/State Government Operation Secure Nationwide	5699	Aero Off Route US Coast Guard Worldwide – Canadian Forces Military Discrete/Spanish Air Force Network	6724	Aero Off Route US Navy Worldwide – Space Shuttle Launch Support/Italian Navy Network/Spanish Air Force Network/RAF Strike Command Integrated Communications System (STCICS)
5140	US Federal/State Government Operation Secure Nationwide	5702	Aero Off Route US Air Force Worldwide (USB/ALE) – SIPR (Secret Internet Protocol Router) Network/Canadian Forces Vancouver Military Discrete/Spanish Air Force Network	6727	Aero Off Route US Air Force Worldwide – German Navy MATELO ARCN (USB/RTTY)/Japanese Military Stations/Norwegian Navy MARPAT
5171	US Navy FACSAC Frequency Virginia Capes, VA "Giant Killer"	5705	Aero Off Route US Air Force Worldwide – Airborne Command Post Network <Z-145>/Dutch Navy PBB NAS Valkenburg	6730	Aero Off Route US Air Force Worldwide – Special Operations/AMC Command Post Ramstein AB "Metaphor"/Danish Air Force Network/German Air Force/Navy Network/Italian Navy Network/Spanish Air Force Network
5180	NASA Space Shuttle SRB Recovery Net Atlantic Ocean	5708	Aero Off Route US Air Force Worldwide (USB/ALE) – Scope Command ALE Network/French Navy Atlantic Network "Armour"	6733	Aero Off Route US Air Force Worldwide – Italian Navy Network
5190	NASA Space Shuttle SRB Recovery Net Atlantic Ocean	5711	Aero Off Route US Air Force Worldwide (USB/ALE) – US Government SHARES SCN ALE Network <Channel 4>	6736	Aero Off Route US Air Force Worldwide – RAF Strike Command Integrated Communications System (STCICS)
5192	US Federal/State Government Operation Secure Nationwide	5714	Aero Off Route US Navy Worldwide – Canadian Military Aeronautical Communications System (MACS)/German Navy Network/UK Royal Air Force Architect Network	6739	Aero Off Route US Navy Worldwide – HF Global Communications System (HF-GCS) <Primary>/UK Royal Air Force Architect Network
5195	US Federal/State Government Operation Secure Nationwide	5717	Aero Off Route US Navy Worldwide – Canadian Forces Military SAR Discrete/German Air Force Network/NASA Space Shuttle Support	6742	Aero Off Route US Coast Guard Worldwide
5198	Canadian Forces Maritime Command Network Worldwide	5720	Aero Off Route US Navy Worldwide – Belgium Air Force Network/RAF Strike Command Integrated Communications System (STCICS)	6745	Aero Off Route US Navy Worldwide – Canadian Military Aeronautical Communications System (MACS)
5202	US Army National Guard Nationwide (USB/ALE)	5723	Aero Off Route US Navy Worldwide	6748	Aero Off Route US Navy Worldwide – Belgium Air Force Network <YF>/Italian Navy Network/RAF Strike Command Integrated Communications System (STCICS)
5204	US Air Force Special Operations Europe	5726	Aero Off Route US Navy Worldwide – Antarctica Operations	6751	Aero Off Route US Air Force Worldwide – E-8 JStars aircraft discrete/Space Shuttle Mission Support "Cape Radio"/Air National Guard Operations/German Air Force Network
5211	Federal Emergency Management Agency (FEMA) NECN Nationwide (USB/LSB) <FEMA-1U/L>	5732	US Air Force Special Operations Worldwide	6754	Aero Off Route US Air Force Worldwide – Canadian Military Aeronautical Communications System (MACS weather only)/NATO AWACS Discrete DHN66 Geilemkirchen "Magic"
5217	US Army National Guard Nationwide (USB/ALE)	5733	Aero Southeast Asia (SEA-3) Major World Air Route Area		
5232	US Army National Guard Nationwide (USB/ALE)	5745	US Navy SESEF discrete Mayport, FL		
5236	US Government SHARES SCN Voice Network Nationwide <Channel 1>	5765	Armed Forces Network (AFN) Guam Local Night		
5255	Maritime Administration Nationwide/Federal Highway Administration (FHWA) Network <F-02>	5770	US Army National Guard Nationwide (USB/ALE)		
5272	US Coast Guard Tactical	5777	US Army National Guard Nationwide (USB/ALE)		
5277	Drug Enforcement Administration Worldwide Night Primary <Alpha>	5800	US Air Force Airborne Command Post Network Worldwide <Z-150>		
5298	US Army National Guard Nationwide (USB/ALE)	5817	US Army National Guard Nationwide (USB/ALE)		
5300	US Transportation Command Nationwide	5840	US Navy Tactical Network Worldwide		
5304	US Navy SESEF discrete Yokosuka Japan	5841	Drug Enforcement Administration Worldwide Night Secondary <Bravo>		
5305	US Transportation Command Nationwide	5847	US Army National Guard Nationwide (USB/ALE)		
5320	US Coast Guard Tactical Network Worldwide	5850	Canadian Forces Halifax Military Discrete Worldwide		
5323	US Army National Guard Nationwide (USB/ALE)	5860	Federal Aviation Administration (FAA) Network Nationwide (USB/ALE)		
5326	US Army Corps of Engineers Point to Point Network Nationwide (USB/ALE) <Channel 3>	5875	US Air Force Airborne Command Post Network Worldwide <Z-155>		
5349	US Air Force Special Operations Europe	5877	US Army National Guard Nationwide (USB/ALE)		
5350	US Air Force Hurricane Contingency Support Net Eastern Test				

continued on page 83

Of Cable, FM Reception and Sirius Issues

The bulk of reception problems I've encountered through the years could be traced to the antenna cable or lead-in. Singlemost among those are problems with coax cable connections. It's very rare that there's a problem with a receiver and just as rarely there may be a problem with an antenna. The place I look first when there seems to be a problem with reception is either end of the coax. I've found this to be the case for antennas from long wave to Ku-band satellite TV reception.

◆ Get the Right Cable for the Job

Coaxial cable is made with a solid or twisted center conductor around which has been set *dielectric* foam. The foam insulates the conductor from the *shield* which can be either a foil or metal braid. The purpose of the shield is to make the center conductor less vulnerable to electrical interference and provide a ground. Covering the braid is a plastic weather coating which is typically black. Most coax cables look alike and it might be tempting to just use whatever coax is in the junk box when you're putting up a new antenna, but each cable has its own place.

There are basically two types of coax cable that most of us are interested in: 50 ohm and 75 ohm coax. Here are the essentials: Most communications radios such as scanners, amateur radio transceivers and CB sets all have 50 ohm antenna connections. The most common 50 ohm cable is RG8 and RG8/M. The RG8 is nearly 1/2" inch in diameter (which makes it more expensive and harder to work with) and has 1.9 dB loss per 100 feet at 100 MHz.

The RG8/M is nearly a 1/4" in diameter (much less expensive and easier to work with) and has 3.7 dB loss per 100 feet at 100 MHz.



RG8, RG8M and RG6. These are the most popular coax cables used for short wave listening, ham radio, CB, and scanner monitoring. But which do you use for which? (Courtesy Radio Shack)

The losses become more significant at higher frequencies: RG8 has 4.1 dB loss per 100-ft at 400 MHz and RG8/M has 8.0 dB loss per 100-ft. That's why the larger more expensive RG8 is used in UHF work and most short-wave and HF ham antennas use RG8/M.*

Most TV sets and many FM receivers use 75 ohm coax even though most antennas are 300 ohms. To balance the feed line a *matching transformer* (known as a *balun*) is used to change the output of the antenna to 75 ohms at each end of the coax.

Widespread use of 75 ohm coax began in the 1950s with the introduction of Community Antenna TV systems. Towns without nearby TV stations would erect powerful receiving antenna systems and distribute the off-air signals to houses throughout the area. It was the only way many rural towns could receive TV signals. They used 75 ohm coax cable for the distribution, and these systems eventually became known as cable TV.

With the advent of satellite TV, a cable with less loss was needed to run the 1 GHz signal to the receivers often 100 feet or more from the dish. RG6 has been the preferred coax for this job and it has since been commonly used for all UHF/VHF and FM off-air reception as well.

◆ Making the Right Connection

There's quite an art to adding the connectors to coax cable, and it helps if you use special tools. The best 75 ohm connections are made using a crimping tool. The Radio Shack #278-238 hex crimping tool works for RG-58, 59, and RG/6 crimping the three main types of connector: "F", BNC, and PL-259.

Typically these are all done without solder.

When making SWL, ham, CB and scanner antenna connections, it's best to use the solder type. This is be-



Crimpers and strippers help do a perfect job on critical connections. (Courtesy Radio Shack)

cause for transmitting you need a good electrical and mechanical connection, which you can really only get by soldering. There are solder-free "twist-on" connectors but they don't hold up well to plugging and unplugging from a radio or after a lengthy time in the weather.

It's also very useful to have a coax cable stripping tool which gives precise cuts when stripping off the insulation and the foam. Using a knife, box-cutter, or matte knife will work but it's much harder to avoid cutting the shield or nicking the center conductor, thereby degrading the performance of the connection. Explicit instructions on correct attachment of the connectors is found on the back of the packaging for either the connectors or the crimping tool.

Here are some other connecting tips: Test your crimp job by tugging on the connection. If it comes off in your hand you have to try again with a new connector. You may go through a fair number of connectors before you get the hang of it. Remember to buy "F" connectors when doing RG/6 cable. Regardless of the type of cable or connector, always use a coax seal around the outside connectors at the antenna. Moisture is the big killer of RF signals at any frequency, and rain, ice, or snow can seep into connectors which aren't properly sealed. I find CoaxSeal particularly useful for satellite TV installations.

◆ FM Receiver Discussion

In the February issue I advised *MT* reader Bernice Bernotat on FM reception problems from a great distance and under extraordinary geographic conditions. That drew two responses from *MT* readers regarding alternatives in FM reception.

First, this response from Bill Andrade who finds tuning FM on the Internet to be a great alternative to off-air reception for those whose off-air choices are limited. Using an up-graded Compaq Presario PC connected to some very nice audio gear he says, "...I've had good luck with respect to being able to successfully listen to Internet radio. My favorite links are as follows: <http://>

* For a complete chart of various coax cables and their loss ratings download and print out this PDF file from Radio Shack for future reference. <http://www.radioshack.com/images/refguide/c04-p117.pdf>

www.penguinradio.com ; <http://www.radio-locator.com> ; <http://www.wrn.org> ; <http://www.rffun.com> (click on international broadcasters); Windows Media 9.0 and RealPlayer RadioPass.”

I agree. And, to make it even more flexible I would add a small FM transmitter so that the signal could be tuned in all over the house. Internet radio provides a valuable alternative to off-air reception, but in my own situation I’ve found it to be a struggle. Using a relatively slow dial-up connection makes Internet radio hit and miss with more drop outs than a college statistics course. The best hi-fi sites run at a bitrate that’s beyond my connection capability. Some very popular sites will simply be full when I try to access them. Since I have only one phone line I also get bumped off-line when a call comes through. Even using a “Catch-A-Call” system doesn’t help if the phone call lasts more than 30 seconds or if the site is full by the time I hang up and reconnect.

Here’s what *MT* reader John Bruzewski from Michigan had to say. “...I am an avid hi-fi fan...and read many tests of various components. Almost universally, whenever a tester even bothers to check the performance of a tuner these days it is usually poor. The tuning sections in most hi-fi gear are afterthoughts. Having owned three receivers in the last 10 years, from simple two channel stereo to a \$1,000 plus surround receivers, all have been disappointing in the RF department...



Blaupunkt Heidelberg: could this be your dream FM DX radio? (Courtesy Crutchfield)

“But, I have something unusual for you to try...If you have an up to date Crutchfield catalog handy (<http://www.crutchfield.com>), take a look at the Blaupunkt Heidelberg in the car stereo section for \$280. I have one in my car and the FM section on this radio is nothing short of amazing. The sensitivity is outstanding and the selectivity is like a brick wall between frequencies. The RF signals are digitized upon reception and manipulated in some way to accomplish this and it is nothing short of magic. Unfortunately, they do not use this on AM as well as it would be very useful there too...you will need a 12 volt power supply to use it in the home but it has pre-amp outputs if you want to use it with a stereo system...”

This is a great idea, John. Radio Shack makes an antenna adaptor to take a 75 ohm coax and put it into a Motorola plug in the back of the radio. I looked at the specs on this radio and it is clearly the most sensitive of available FM car stereos. If any of our readers care to take the plunge I would be very interested in hearing your experiences.

◆ Sirius Reception Issues

MT Editor, Rachel Baughn, recently wrote about her experiences with Sirius satellite radio: “...We’ve really enjoyed it in the car when driving...but, success in the house has been a little mixed. We don’t really have any north-facing windows; have [the antenna] outside a western window facing north, but we experience drop-outs for 10 minutes to an hour sometimes before it picks up another satellite...”

Antenna placement for Sirius satellite radio is a little different than it is for XM listeners. That’s because of the satellite configuration used by Sirius. They have two satellites traveling in high elliptical orbits so that the receiver is in the footprint of one at any given time. XM uses two satellites in geostationary orbit so it’s more like tuning in satellite TV, once you’ve got a strong signal you can set it and forget it. I haven’t moved my XM antenna for nearly a year. Sirius has a tech page on antenna placement which will show exactly where to point the antenna depending on where you live in the U.S. To find the tech page go to <http://www.sirius.com>

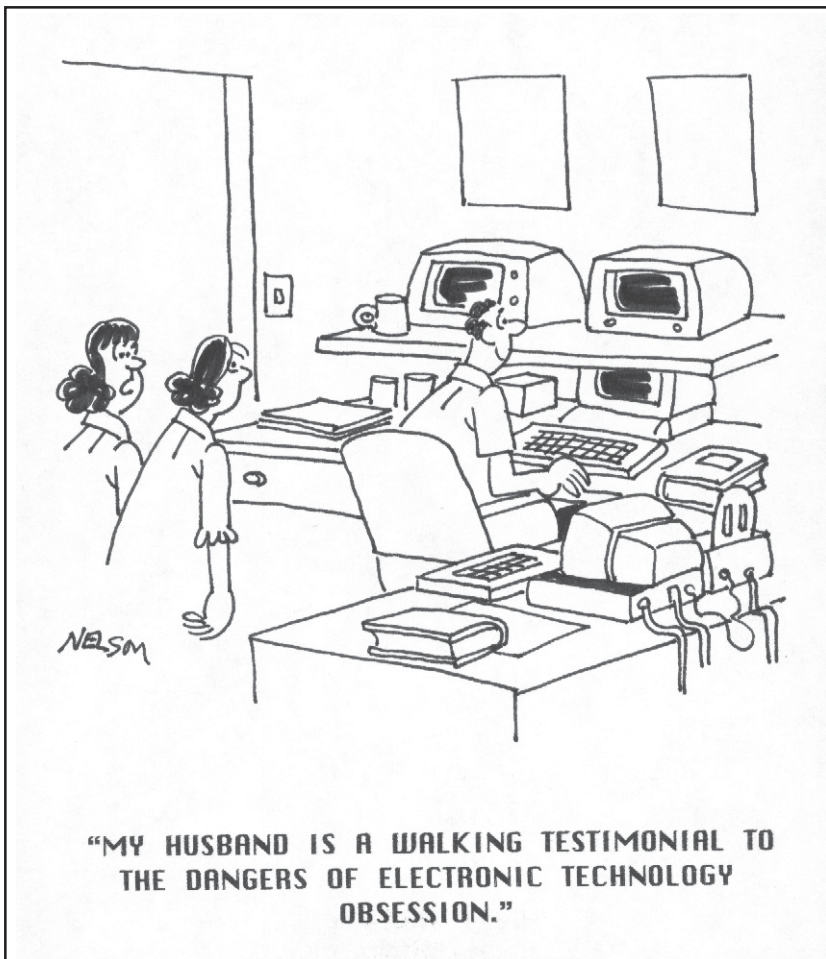
click on “site map” and then click on “home antenna tips.”

Sirius recommends placing the antenna on the roof and adding an extension cable if necessary. Most people aren’t going to do that. Their second choice is to place it outside somewhere preferably in the direction best suited for your location as described by their antenna reception map. And, finally, they recommend placing it near a window, again facing the direction as indicated by their map. I recommend extensive placement experimenting. I found that I could simply set the antenna on the top of the bookshelf over the stereo and it worked just fine.

Then I had to move the stereo across the room and had a tough time finding another “sweet spot” for reception. Eventually I placed it on a valance over a window, of all places. But, in roaming around the house to test other places to put the antenna I found it could often just sit beside a radio into which the audio output was plugged. One thing to remember is to use the tilt function on the antenna, as sometimes just raising the angle is enough to fill the three bars on the antenna signal meter.



Kenwood Here2Anywhere goes with you in the car or sticks around home to entertain. Just take your time placing the antenna. (Courtesy Sirius Satellite Radio)



Q. I recently purchased a frequency counter, but I don't know if it's working properly. I've tried to see frequencies at the base of a cell tower, my wireless 2.4 GHz router, and my cordless phone; the phone seemed to show the proper frequency, but the LCD signal-strength bar graph never moved. (David Jolly, email)

A. I suspect that the frequency counter is working properly. A frequency counter does not have the sensitivity or tuning selectivity of a receiver; if it had high sensitivity, it would respond to all signals at once and the display would randomly flash numbers, a summing of all the signals (like the cell tower), and a wireless network router continuously changes channels back and forth.

Try taking it to a more powerful, stable signal source such as a local broadcasting station (FM or AM) or even a police station; I think you will get much better results!

Q. Just as an experiment I recently connected a 100 foot random-wire antenna to my scanner. To my amazement, I was hearing VHF and UHF signals stronger than with my Radio Shack discone and an Antenna Warehouse log-periodic. Does this make sense? (Steve O'Connor, email)

A. It's not unusual for a random-wire antenna to receive signals on VHF and even UHF, and especially well on 30-50 MHz low band, but the fact that they are stronger on higher frequencies than with your previous antennas probably points out their deficiencies, not the superiority of the wire.

Although a long wire intercepts more signal voltage than a small antenna, that doesn't mean it all gets to the receiver. There are many other factors that come into play such as impedance, wavelength, directivity, phase relationships, gain, reflected power, and polarization.

I suspect that your wire is receiving signals from specific directions conditionally, especially on low band, but not as well on high VHF and UHF as a good scanner antenna such as the well-respected ScanTenna would provide. However, if it is hearing what you want to hear, it's adequate.

Q. Here in Illinois we have a toll-way transponder system to automatically detect and charge users from their prepaid accounts; it uses a frequency of 802.11 MHz. How does it work? (Ron Blocker, Glenwood, IL)

A. The iPass system is a form of radio-frequency identification (RFID) which automatically polls active stickers on bumpers or inside windshields as the vehicle passes a toll booth. 802.11 is not a frequency, it's a reference to an FCC regulation which provides for license-free digital communications, telemetry and data exchange in the 2.4 and 5.8 GHz spectrum; the most commonly-used protocols are known as Bluetooth and Wi-Fi.

The tiny package contains an antenna, a receiver, a transmitter, and a coin cell for power. When it detects the polling transmitter, it fires back its identification number and a computer deducts a toll from a prepaid account.

Details are difficult to find on this system, so some of this is speculation on my part; corrections and additions from our readers are always welcome.

Q. I remember reading some time ago in MT your explanation of how to reduce or eliminate electrical spark interference to a shortwave radio from an aquarium heater; would you mind telling me again? And do I really need to take the preventive step if the aquarium is several feet away from the radio? (Terry Powers, La Mesa, CA)

A. The modification is a simple matter of soldering a 0.1-0.47 microfarad, 400-600 working-volt capacitor across the thermostat contacts to reduce the spark that's responsible for generating the interference. You can solder it most anywhere along the wiring that attaches to the two contacts with the same results. And yes, even at a distance of several feet away, you'll hear the interference since it radiates to your antenna, not to the radio itself.

Q. I recently replaced a gas valve and thermocouple on a gas furnace. I know that the dissimilar metal of a thermocouple produces

electricity when heated, but how does it control gas flow? (Mark Burns, Terre Haute, IN)

A. You're overlooking one other interesting characteristic displayed by two dissimilar metals when they are bonded together – they bend! Thus the heated metal acts as a valve gate, automatically controlling gas flow.

Q. My old scanner has poor audio filtering, so I hear distracting humming and tones right along with the communications. Is there some way I can filter this out at the speaker itself? (Paul Kamalsky, email)

A. Yes. To reduce low-pitched hum from sub-audible squelch tones (CTCSS) or even AC ripple from the power supply, you can put a small, low-voltage, electrolytic capacitor in series with either speaker lead; experiment with values in the 10-100 uF range. Similarly, if the tone is a high pitch, try placing the capacitor across the speaker terminals.

Q. Can the voice-recognition software, IBM Via Voice, display and print out a transcription of an off-the-air transmission heard on a shortwave receiver or scanner? (Brian Bowie, Medford, OR)

A. Any voice-recognition program can process analog voice from a mike, tape recorder, or even off the air from an external speaker jack on a scanner or shortwave receiver. The problem comes in its learning the particular voice. Some programs, like *Dragon Naturally Speaking*, are much better than others doing this.

If you are listening to a well-spoken broadcaster observing the rules of enunciation and diction, then all is well, but if you come across a twangy, inarticulate "Tain-fower good buddy," you're in trouble!

Questions or tips sent to Ask Bob, c/o MT are printed in this column as space permits. If you desire a prompt, personal reply, mail your questions along with a self-addressed stamped envelope (no telephone calls, please) in care of MT, or e-mail to bobgrove@monitoringtimes.com. (Please include your name and address.) The current Ask Bob is now online at our website: <http://www.monitoringtimes.com>

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Modify your FRS radio to receive 800 MHz cellular frequencies! Open the radio, and look for the purple wire. Cut it, and tape the ends. Now do a master CPU reset.

There, you accomplished *nothing*. There is no such modification possible. But I did get your attention!

In most of my scanners, I have a bank especially dedicated for the FRS, GMRS, and MURS frequencies. You never know what you will hear. Hang-gliders can often be heard on 151.625, 151.925, and 151.995. I also use my FRS radio to scan all the FRS frequencies. I use my FRS radio in scanning mode with the PL tone set to off. The really bright idea? Be prepared for April Fool's Day.

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Egad! I offered to email my list of "correct answers only" question pool for the FCC Technician class exam. I was swamped. No more requests please. Instead, we have posted the file on the *MT* website at

<http://www.monitoringtimes.com/html/mttechanswers.html>. MFJ must also read this column closely, because they now offer the questions in the same format for the General and Extra class licenses as well as Technician. Contact them at 1-800 647-1800 or <http://www.mfjenterprises.com>. Go for it! You can do it!

28

Have you ever heard some really exciting and unique radio traffic? Did you say, I should have recorded that? I realize many listeners already make use of tape recorders, but I found a new, cheap digital recorder. I was browsing at Radio Shack

and spotted a small device about the size of a cheap cigar. This all-digital recorder (no tapes) was so small I could set it in my coffee cup that holds my pens, and extra rubber duck antennas. Just click it on, and lay it near the speaker. It has 125 minutes of record time. Always at your fingertips. All for under \$40. When tabletop space is at a premium, this is the answer. I think I will get another one for the car. I often have great ideas while traveling, but I forget them by the time I get home. *Last minute follow-up. These digital recorders are so useful, I now carry another in my pocket all the time.*

Power Strips:

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A few columns back, I noted the fantastic new RigRunner™ DC power strip from West Mountain Radio. This device uses the new Anderson Power Poles™, and makes DC power connections a snap. Literally. I lamented that it did not have an off/on switch. Well, those

guys must have reading the column, because they came out with a new product that had the on/off switch.

They even went one better, and added a feature where you could plug your main radio into the "Master" switch. When you turn off your radio, it automatically turns off all the other connections, without touching the power strip itself. Very helpful if you place the power strip out of sight, or in an inaccessible space. Besides this "Auto" mode, you also can control it with a standard single pole off/on switch.

They also sell a separate, but expensive, voltmeter and analyzer. It connects inline, and uses Anderson power poles naturally. Manufactured by Astroflight Inc., it display volts, amps, watts, and milliamp hours. It should, because it costs \$70. Naturally, I had to have one. Writing this column is an expensive venture!

MFJ had been sleeping for a while, but they awoke and created a new DC power strip that incorporates their old features with the new technology. I purchased model# 1126. It uses a permanently attached power cord to connect to your power source. And what a cable. This monster must be a gauge six or eight. It handles a maximum of 40 amps. Connections 1, 2, and 3 are always hot. Connections 4-8 are controlled with an Off/On switch. This model also includes a voltmeter. The Instruction Manual was very helpful.

Another DC power distribution product has emerged from Saratoga Amateur Radio Products. At <http://www.hamstop.com>, I purchased their "Power Panel 8." One position for DC power in, and seven for DC out. No meter, no manual, no connection cord, no switches. But that is OK. For simple DC power hookups, you can get by without all those bells and whistles. If all you are going to do is power up some scanners and accessories,

this will work great for about \$54.00. Even less if you buy it as a kit, which includes a CD with manual, and instructions. Hard to imagine what could be added to any of these products, but I suspect their engineers will find some new features. I give them all high marks in every category commensurate with their cost.

<http://www.hamstop.com/>
<http://www.mfjenterprises.com/index.php>
<http://www.westmountainradio.com/>

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Ever buy a used ham radio that had no operating manual? Try the *Lost User Manual* from Artsci at 1-(818) 843-4080 or <http://www.artscipub.com/>. You can also

post a message with the Yahoo group for that particular radio, and see if a manual is posted in the files section. You can also ask if anyone is willing to make a copy of the operating manual. You should, of course, offer to pay for the photocopying and postage to your home location (QTH.)

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My new Radio Shack voltmeter #22-810 had a design problem. The black and red wire leads were too long. They would not fit back into the case easily. I had two options: shorten them by unsoldering and cutting a short piece off, then resoldering,

or curl up some extra cord length inside the compartment. Either way it works great. If you think creatively, it is amazing how many problems you can solve. Remember, if you have a problem, or a better solution, let me know.

32

Try something new. We all get lazy, and tend to use the same search engine for all our web surfing. Well, I added several more as buttons to my Links toolbar. Here are some possible new search engines. Now I try several when researching a topic. That accomplished, I feel I have truly searched the net for my topic. Tip: Check these websites out in exact order.

<http://www.search.com/>
<http://www.searchenginecolossus.com/>
<http://searchenginewatch.com/>
<http://www.dogpile.com/>
<http://www.google.com/>
<http://www.altavista.com/>
<http://www.metacrawler.com/>
<http://www.mamma.com/>
<http://www.lycos.com/>
<http://www.webcrawler.com/>
<http://www.msn.com/>

If you are reading the downloadable electronic version of *Monitoring Times*, you can just click on the URLs above and be magically delivered to the desired website. That is all I have room for this month. Send me your bright ideas, problems, or solutions.



Internet-Enhanced Scanning

The Internet has become an important resource for scanner listeners. Frequencies and system descriptions can be found on numerous web pages, easily accessible through major search engines like Google and Yahoo! The Internet can also provide actual scanner audio from a wide selection of hobbyist broadcast servers.

❖ Scanning via the Internet

Dan,

I found your piece on-line regarding "Computer Interfacing Your Scanner." I am trying to set up a system where I can have a computer in Los Angeles (in a relative's home) connected to a couple of scanners tuned to police, fire and rescue frequencies and send the audio via the Internet to me in Minneapolis where I now live. Do you know of a way I can accomplish that and where would I go to get the hardware required?

Thanks a million for your help!
Ron in Minnesota

There are two different ways Ron can satisfy his desire to listen to Los Angeles scanner activity while he's in Minneapolis, or anywhere else he has access to the Internet.

Audio On-Line

The easiest way is to locate an existing audio feed that carries L.A. traffic. There are several web "broadcasters" that operate from Southern California and may already be delivering the public safety activity that Ron is looking for. Listening to these broadcasters is a matter of entering their address into a web browser and following a few simple directions. In some cases you may have to download a "helper" audio application, depending on the particular broadcaster.

Feeds from the Burbank, Glendale and Pasadena area are available from <http://verdugo.ci.glendale.ca.us/radio.html> which is coming from the Verdugo Fire Communications Center in Glendale. Their audio feed requires the latest RealOne Player Software, but it's a free download and installs easily.

A hobbyist in Monrovia runs a site at <http://members.101freeway.com/gmitch/feed.htm> which appears to work from the Microsoft web browser Internet Explorer

without any additional downloads.

Verdugo and Los Angeles County Fire can be heard from <http://www.k6ccc.org>, which has a selection for Windows Media Player (a software utility that comes with recent Microsoft Windows operating systems like Windows 2000 and Windows XP).

Over time some of the hobbyist-run web sites seem to come and go, and may occasionally be out of service due to some kind of technical difficulty. In case these links stop working at some future time you can check a large list of Internet-based scanners at <http://www.ku4ay.net/netscanners.html>. At last count it had more than 30 audio links. You can also use a general search engine like <http://www.google.com> with search terms like "Internet", "audio" and "scanner" to locate additional feeds.

Computer Aided Dispatch

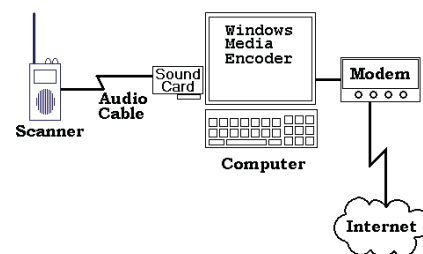
As an aside, there are also a number of municipalities that provide Computer-Aided Dispatch (CAD) information on the Internet. The sites continuously update screens that contain basic call information such as address, type of call, responding units and current status. For instance, the California Highway Patrol maintains traffic accident and incident information at <http://cad.chp.ca.gov>. From there you can select among more than 20 dispatch centers across the state, including Los Angeles. This will allow you to keep tabs on incidents and events without needing to listen all the time. Other cities have similar versions of this service on-line, including Dallas (Fire-Rescue incidents at <http://www.dallasfirerescue.com/fadata/fdindex.html>), Martin County, Florida (<http://www.sheriff.martin.fl.us/cad/cad2.html> for police and <http://www.martin.fl.us/GOVT/depts/esd/livecad/esdcad.html> for fire), Miami-Dade County, Florida (<http://www.co.miami-dade.fl.us/firecad/wwwcipnew.asp> for Fire-Rescue) and Ventura County, California (http://fire.countyofventura.org/fireline/frameset/f_pages/index.asp).

Do It Yourself

If you'd like to set up your own scanner audio feed, whether for broadcast to the world or for your own personal link, there are few things you'll need.

Hardware

You will need a fast personal computer, preferably one dedicated to this task. The software audio encoder (see below) will determine the specific speed and memory requirements. The computer will also need a sound card with *Line In* or *Microphone In* jacks.



Radio

Obviously you'll need a scanner that can provide good quality audio via an *External Speaker* jack. Some web sites use a computer-controlled scanner to provide current channel and frequency information to the listener, but it isn't a requirement.

Audio Cable

You'll need the proper audio cable to connect the audio output of your scanner to the input of the sound card.

Software

You will need to run a software program on the computer to take the scanner audio and encode it for transmission over the Internet. A free download from Microsoft (<http://www.microsoft.com>) will get you the latest version of Windows Media Encoder (Version Series 9 is current as of this writing). This program runs under the Windows 2000 and Windows XP operating systems and provides all of the capability you'll need. The recommended configuration for broadcasting scanner output is a machine running at least an 866 MHz processor with 256 MB (megabytes) of RAM, although slower machines may work well enough for your purpose.

Internet Connection

Finally, you'll need a high-speed connection to the Internet, such as cable or digital subscriber line (DSL). It will help if you have a static IP address, in order for listeners to easily locate your audio stream.

Internet Broadcasting

After downloading and installing Windows Media Encoder, you'll want to set it up for a broadcast using the following steps.

In the *New Session Wizard*:

- Select the "Broadcast a live event" option;
- Select the audio device (this must match the sound card and input your scanner is hooked up to)
- Choose "Pull from the encoder"
- Select the HTTP port (choose the defaults for now)
- Select Encoding Rates (choose the defaults for now)
- Select whether to archive the "broadcast"
- Enter Display Information to identify the details of the content (your location, radio hardware, etc.)
- Review the settings, then click on 'Finish'
- Click on the 'Start Encoding' (green ball) tab at the top

At this point you should be encoding the audio from your scanner and are ready to accept connections. At the receiving end, listeners will need to enter your static IP address and the port number you selected in the encoder. If they're running an up-to-date browser under Windows they should be able to start Windows Media Player and hear your broadcast!

If any readers are currently providing scanner audio over the Internet, I'd love to hear about your hardware and software setup. Drop me an e-mail and let me know what you're up to!

◆ Monroe County, Michigan

Monroe County, located in southeast Michigan on the Ohio border, recently voted to take out a \$3 million loan to pay for a part of a new \$9.3 million radio system. The rest of the bill will be paid by a grant from the federal Department of Homeland Security. The county hopes to pass a monthly surcharge on local telephone service in order to repay the loan.

Monroe County intends to replace their 1950's-era radio system and join Michigan's existing statewide APCO Project 25 system. The money will buy towers and dispatching equipment as well as nearly a thousand mobile and portable radios.

Since the state charges \$200 per radio as a system maintenance fee, local governments will have to pay for that on top of any repair or replacement costs for their new radios.

Until the replacement occurs, you can hear the Monroe County Sheriff's Department dispatching on 460.175. They also use 453.275, 453.525, 453.625 and 460.425 MHz. Monroe County Fire is on 154.430

MHz, with Fireground on 154.355 and Emergency Medical Services on 155.235 MHz.

◆ Ingham County, Michigan

To the northwest of Monroe County, Michigan's Ingham County is taking a different path. They have contracted with M/A-COM to build a \$10 million EDACS (Enhanced Digital Access Communications System) radio system for their public safety personnel. They plan on having four repeater sites and ten radio frequencies to provide coverage for about 1,600 mobile and portable radios.

Ingham County has a population of nearly 300,000 people, with a third of those living in the state capital of Lansing. The county is also home to Michigan State University, with a student population of more than 40,000.

The choice of EDACS rather than an APCO Project 25 system means that Ingham County will need additional equipment to talk with other counties and with the state's digital system. Instead of being able to communicate directly, converters will be needed to translate between the EDACS protocol and the P-25 standard.

For now, you can hear the Ingham County Sheriff on 460.350 (Primary), 460.075, 453.325 and 460.300 MHz. Ingham County Fire uses 154.040, 154.415 and 154.430 MHz. Fire activity in the southern part of the county can be heard on 155.940 MHz.

The city of Lansing uses several frequencies, as follows:

Lansing City Police (North)	460.200
Lansing City Police (Information)	460.300
Lansing City Police (Tactical)	460.400
Lansing City Police (South)	460.500
Lansing City Police (Administrative)	453.050

The Michigan State University Police are reportedly heard on 460.275, 460.375 and 460.450 MHz. The county's Regional Medical Center has two main frequencies, 152.010 and 163.250 MHz.

◆ Westport, Massachusetts

The Westport Police Department, located in southeastern Massachusetts about 50 miles south of Boston, has been operating on a new UHF radio channel since the end of January. As with many other systems across the country, funding came (in part) from the Department of Homeland Security.

Police officers had been complaining for some time about "dead zones" where they had poor or no radio coverage. Police now have new radios along with a new repeater, which is now sharing space on a cellular telephone tower.

The new frequency for police operations is 471.400 MHz, replacing the old 155.370 that was shared with the town of Warren, Rhode Island (just across Mount Hope Bay). Westport was also licensed to use 153.095 and 158.745 MHz, but I don't have any reports about current activity on those frequencies. Countywide

fire can be heard on low band at 46.18 MHz and in UHF at 460.8375 MHz.

◆ South Dakota

I enjoyed your February 2004 article in Monitoring Times on the statewide VHF trunking system in South Dakota. Checking your web site I found the frequencies list great but... what type of radios are they using or who makes the system and which trunk tracker scanner will work it?

Jim

South Dakota is using a mix of radio manufacturers, but all of the equipment follows the APCO Project 25 standard for the "air interface." What that means is that any of the digital scanners currently on the market should work. However, in South Dakota the biggest problem might be how to get it home from the store.

Apparently there is a state law from 1965 that prohibits the possession of police scanners in non-law enforcement vehicles. It's not clear how well this law is being enforced, but the state attorney general seems to believe that the intent of the law is to keep scanners out of vehicles.

That same law also requires business owners to get written permission from the county sheriff or state attorney general before having a scanner in their business, which makes me wonder how Radio Shack manages to legally sell scanners in South Dakota. Do they have written permission? The statute in question, taken from the South Dakota legislature website, is:

23-4-5. Unlawful possession of receiving set or converter without permission — Seizure by peace officer. The possession of any receiving set or converter described in § 23-4-2 in any vehicle or business establishment, without permission pursuant to § 23-4-3, will constitute prima facie evidence of possession for unlawful purposes, and such receiving set shall be deemed contraband and shall be confiscated by any peace officer of this state and delivered to the attorney general for disposition.

So, in South Dakota, if you have a scanner in your car or in your business without permission (or unless you are a licensed amateur radio operator), it is assumed to be for unlawful purposes. On top of that, if you've been convicted of a felony within the past ten years, you can't have one at all:

23-4-2. Possession by felon of police radio as misdemeanor — Radio stations unaffected. No person who has been convicted of a felony in this state or elsewhere within the past ten years shall possess any frequency modulation receiving equipment capable of being so adjusted or tuned as to receive messages or signals on frequencies assigned by the Federal Communications Commission to local or state law enforcement officers, or to the state or any of its agencies. Any person who violates this section is guilty of a Class 2 misdemeanor. Nothing in this section shall be construed to affect any radio station licensed by the Federal Communications System.



◆ Southern Wisconsin

I received the following e-mail from a reader in Wisconsin who was working out some of the non-public safety systems in his area.

I want to share with you and your readers in Northern Illinois and Southern Wisconsin what I have learned about Logic Trunking Radio systems. I found a way to do an LTR frequency search with my Uniden BC780XLT scanner with a Scantenna antenna mounted on a twenty-foot tower. The Bearcat manual doesn't tell you how to do a frequency search.

I found several new Logic trunking systems that are not listed in the new 2004 Police Call frequency guide. All the frequencies must be programmed in their proper order. These are the systems that I found so far:

1) Kenosha and Walworth counties LTR system
01 451.6000
02 451.4000
04 452.8000
05 463.5625
09 464.5875
10 451.7000

2) Milwaukee and Waukesha county system
01 860.0875
02 860.5875
05 859.0875
06 859.5875
09 858.0875
10 858.5875
13 857.0875
14 857.5875
17 856.0875

Don't program 858.5875 because all the mobile id's have their own id numbers, and you can't follow a conversation with the base stations.

3) Milwaukee and Waukesha counties LTR system
01 451.5500
02 451.7500
04 452.2500
05 452.1750

4) Milwaukee county LTR system
01 452.2125
02 451.9875
03 452.9875

5) Milwaukee county LTR system
05 451.8625
15 452.3375

I think this system needs more frequencies.

Please let me know if you have any more information on any of these LTR systems that I have sent you. Thank you.

Joel in Milwaukee

Since I don't live in Wisconsin to check the frequencies directly, my first stop was the Federal Communications Commission wireless database at <http://gulfoss2.fcc.gov/cgi-bin/ws.exe/genmen/index.htm>

It reports that the frequencies for the first system are assigned to two different licensees. First, General Communications Inc, out of Madison is assigned 464.0000, 451.4000,

451.6000 as well as 463.2625, 463.5625 and 464.5875 MHz. A second licensee holder by the name of Richard Manthly transmits out of Brighton on the following frequencies: 452.7500, 452.7000, 452.8250, 452.8750, 461.5000, 461.9000, 461.9500, 464.7000, 451.7000, 451.9000, 452.6500, 452.7250, 452.7750, 452.8000 and 452.0750 MHz.

The second system on the list is licensed to Jack D. Warden out of West Allis. A transmitter site in Milwaukee uses 856.0875, 857.0875, 858.0875, 859.0875 and 860.0875 MHz. A separate call sign has 856.5875, 857.5875, 858.5875, 859.5875 and 860.5875 MHz listed.

The third and fourth systems are both under a license to General Communications. A Platteville transmitter site has 451.55, 451.35 and 451.225; a Milwaukee site uses 451.7500, 452.0500 and 452.5000 MHz, and in Muskego we have 451.5500, 451.7500, 452.1750, 452.2500 and 452.9750 MHz. The fourth system falls under two Milwaukee sites with 451.9875, 452.2125, 452.2375, 452.9875 and 461.4500 MHz.

Viking Clear Channel out of Milwaukee owns the last system. A site in New Berlin is licensed for 463.8125, 461.3875, 463.8125 and 453.0125 MHz while a West Milwaukee site lists 464.4375, 463.9375, 451.8625, 452.0125 and 461.4625 MHz. A second license covers 452.3375 and 452.7375 MHz from Milwaukee.

I forwarded this information to Joel so he could check it out and he soon responded with the letter below, explaining his process for working out LTR frequency order.

I have been going through the frequency list you sent me, and 464.000 works on channel 03 for the Kenosha & Walworth counties LTR system. Thank you. I would have had a hard time to find this one on my own. I see the 01 id's

from 01 451.6000 drop to 03 464.000 as people talk. Also, the 02 id's on 02 451.4000 drop to 04 452.8000 as the id's talk.

Dan, checking frequencies for LTR id numbers is a very time consuming process. The id number 1-18-189, for example, means the frequency showing this id number gets programmed on channel 18. The home repeater #18 indicates the channel number placement between 1 and 20.

To do this, one scanner bank must be programmed for LTR trunking. Enter the frequency to be checked on one of the channels 1 through 20. Then press trunk twice to make it an LTR frequency. Then press trunk again to start the checking process. Wait until a person speaks, and the LTR number will come up. Or wait for a repeater confirmation beep of 253—like 0-03-253. This means it gets programmed on channel 03.

Sometimes, you will see 01, 02, 03, or more. There are frequencies that have no home repeater id's. There are three of these in most LTR systems. These are hard to place in the proper channel order. There are two ways to do this. The first is to sit and wait for a repeater beep of 253. It will show up like 1-04-253. Program it on channel 04. The other way is to program all 20 channels with the frequency and watch for the indicator light where it lights up and remove all the extra ones until the right place is found.

I wish I had a better way to do this search, but this is the only way I know to do this.

Joel in Milwaukee

That's all I have for this month. More information and links can be found on my web site at <http://www.signalharbor.com>. I also welcome your questions, comments and activity reports via electronic mail to danveeneman@monitoringtimes.com. Until next time, happy scanning!

General Menu Reports - Table Of Contents - Netscape

File Edit View Go Communicator Help

Bookmarks Netsite: <http://gulfoss2.fcc.gov/cgi-bin/ws.exe/genmen/index.htm>

Federal Communications Commission

General Menu Reports - Table Of Contents

Licensee (Service)	Licensee/State
State/County	State/County/Frequency
Frequency	Frequency/State
Latitude/Longitude (Service)	Callsign
Latitude/Longitude/Freq	Licensee/Zip
Pending File Number	Parent Child Callsign
Tow Air Query	ULS Antenna Structure Registration Query

GenMen Cue Cards

We have opened a parallel site for the General Menu Reports [here](#). It accesses the same data as this site, however, when load is very high it can be used as an alternate site when this site is slow due to high traffic.

NEW! Messages regarding the General Menu Reports are now available [here](#). Please check this board for messages regarding the system! An important message was added Friday afternoon, Dec. 1.

DISCLAIMER

Start [Taskbar icons] 2:09 AM

The Bloom Boom

About fifty kilometers northwest of Toronto is a city with a colorful history. "Brampton is Blooming" is a city motto that reflects its history as "Flowertown." The blooming business has largely moved away, although remnants can be found if you know where to look.

The city has outgrown its humble beginnings in the flower trade while other industries have boomed here. For example, it hosts the world headquarters of a major international telecom equipment vendor. Brampton represents the southern terminus of the Orangeville and Brampton Railway that we have been following for the last three months. The tracks go on to link up with the main lines further south in Streetsville, but our journey ends here.

Frequencies to monitor in Brampton, Ontario

Fast Food Restaurants

Tim Hortons 30.58
KFC, Country Style Donuts 30.84
Wendys 33.40 30.84 464.2125
Burger King 33.40
McDonalds 464.6250
Harveys 464.6250

School Buses

Laidlaw Transit 141.030 167.265 408.1625
Parkinson Coach Lines 158.505
Stock Transportation 165.360

Province of Ontario (GMCO)

148.600 149.170 149.200 149.335 149.440
149.605 150.100 152.000 414.4125
414.6125

Canadian National Railway

Intermodal Terminal 160.665 160.785
161.025 161.415
Brampton Container Yard 459.2250
Bramalea GO Station 161.415

City of Brampton

Transit System 410.0125 411.2375
Parks & Recreation 413.5875 418.5875
418.7125
Works & Transportation 413.7125
Works & Transportation Canada-Wide (DGPS)
440.2875 440.2875

Regional Municipality Of Peel

928.84375
shared with Hydro One Brampton Networks
821.0875 821.1875 821.2125 821.3375
821.4375 821.4625 821.5875 821.6875
821.7125 821.8375 821.9375 821.9625
822.0875 822.1875 822.2125 822.3375
822.4375 822.5875 822.6875 822.8375
822.9375

Utilities

Hydro One Brampton Networks 49.43 167.040
928.63125 952.63125
Enbridge Gas Distribution 419.9375
932.19375

Radio Stations

CKMW Radio Ltd. O/A CIAO Radio 450.0625
CFNY FM 450.4000

Miscellaneous

William Osler Health Centre 451.7875
Sheridan College Of Applied Arts and Technology 454.2000
St. John Ambulance 158.535
Nortel Networks World Headquarters:
452.5375 454.2250
Peel Amateur Radio Club repeaters (VE3PRC)
53.190 146.88 443.5500

T-New

Lester B. Pearson airport in Toronto has a new terminal building. Now officially labeled "Terminal One" it replaces the very outdated, over-capacity, old terminal with the same identity. For months this huge building was surreptitiously referred to as "T-New." It is a huge building that rivals some smaller Canadian urban centers for the amount of real estate that it occupies.

In December of 2003, the Greater Toronto Airports Authority invited the general public to tour the facility which is slated to open this month. The new Terminal One Open House attracted many visitors who came to see what billions of our dollars have been spent on. The terminal building alone is impressive, but a major re-development of the approach highways and airport campus roads also took place.

ScanCan took advantage of the occasion to visit the Open House with a camera. I wanted find out more about the new radio system that has been installed. One of the security guards had conveniently left his new Motorola 900MHz handheld radio on a desk while he propped up a nearby wall. The photograph that I took of it is this month's *Scanning Canada* column picture.



Digital radio at
Toronto's New Air-
port Terminal

Morse Code – an Official Language?

The Morse Code question is firmly on the front burner again in Canada. Should the Morse Code test be abolished for amateur radio licensing? *ScanCan* has learned that the Federal govern-

ment has a new plan to promote bi-lingualism in Canada. Effective April 1st, 2004, all amateur radio licensees will be required to demonstrate proficiency in both of Canada's official languages. Furthermore, hams will be required to keep a log of their transmissions and be able to demonstrate to Industry Canada (Canada's radio licensing body) that they have conducted fifty percent of their contacts in each of Canada's two official languages (French and English). As a special dispensation, hams may elect to substitute Morse Code for one of the official languages if they so desire.

Your humble columnist from the Great White North stood up on his hind legs to propagate this story at his local club meeting recently. Despite managing to keep an entirely straight face throughout, I was deservedly greeted with howls of derision from the audience. Of course my mischievous April Fool's tale is entirely fictional, even though it does bear a suspicious resemblance to the bizarre antics of our politicians in that icy burgh known locally as "Disneyland-On-The-Rideau" (Ottawa). The following *true* story illustrates that suspicion.

HMCS Haida "Sunk" in Hamilton Harbor

Canada's World War II vintage, tribal class destroyer, *HMCS Haida*, is a museum ship that in happier days floated merrily in Toronto Harbor. Local radio enthusiasts were welcomed into her radio room to view her equipment at close range. Licensed enthusiasts were even allowed to take over the radio room at weekends and operate from the ship.

As recently reported in this column, the ship was moved to Hamilton, renovated and, according to some distressed veterans, "captured by pirates." Actually, the ship was acquired by an autonomous body of the federal government called Parks Canada. A high official at Parks Canada recently replied to *ScanCan*'s formal letter of protest concerning the closure of the radio room to hobbyists. In his letter, the official identified his disdain for amateur radio and indifference to the wishes of voters to whom his department is not answerable. Hobby radio on board *HMCS Haida* has been sunk, and democracy may have earned a purple heart in the skirmish.

Next Month

Spring is officially here, even though the weather may not consistently support that observation. In May, *ScanCan* will examine the efforts of a volunteer group that provides emergency communications support. No, this is not the Amateur Radio Emergency Service (ARES). Pick up a copy of next month's *MT* to find out more.

Shining Some Sun on 4XZ

ENIGMA is the European Numbers Intelligence Gathering and Monitoring Association. It dropped its print newsletter some time back, but it remains very much alive on the Internet as ENIGMA 2000. They're best known for issuing the twice yearly "control list," which brings considerable order from what would otherwise be chaos in the "numbers" scene.

"Numbers," of course, are those mysterious broadcasts of deeply encrypted messages, presumably from intelligence agencies, and usually with high power and no attempt to conceal their existence. Quite the contrary, numbers stations tend to play music, bang drums, blow trumpets, beep, or repeat hours of tuning markers. They don't care who listens.

The one identifying as "4XZ," while a commonly reported station, is a lot more prosaic. In fact, it isn't really a numbers station at all, though ENIGMA maintains it as M22. The M is for Morse, as the station uses the International Morse Code in CW mode (Continuous Wave telegraphy).

It's now thought that 4XZ is the Israeli Navy in Haifa. While intelligence messages can't be ruled out, most traffic seems to be for the fleet of missile ships, patrol boats, and submarines.

4XZ Frequencies

Like many such stations, a great many frequencies are used. Here are some recent hits, all in kilohertz (kHz): 2680, 2800, 2922, 4241, 4331, 5159, 5911, 6739, 6797, 8000, 8103, 8436, 9255, 10046, 12984, 13966, 18004, and 18427.5. The best time is between 2200 and the subsequent day at 0500 Coordinated Universal Time (UTC).

The station runs hours of channel markers, just "VVV" (a standard test group) then "DE" (from) "4XZ 4XZ." There is usually a parallel transmission on at least one additional frequency, and sometimes many more than that. The marker is occasionally interrupted for a message.

Messages come in three types. There are the encrypted ones using letter groups, the ones in plaintext Hebrew, and the ones in five-number groups.

It's the third type which is by far the

most interesting. This stuff looks as if it would only be readable to spies. However, it's merely talking about the weather.

4XZ Weather Broadcasts

There used to be a lot more weather broadcasts flying around shortwave in Morse code and radio teletype (RTTY). The ones that remain, though, are still usually in one of many very tight, and entirely public, codes. These were designed to move a maximum amount of information over low-speed circuits in a minimum of time. The secret is in their use of symbols, which are letters and numbers standing for entire paragraphs of highly standardized weather text or data.

Everyone has, at one time or another, run across such a weather broadcast and taken it for "numbers." These can look pretty cryptic. For a long time, it was assumed this was the case on 4XZ. Someone, though, finally recognized some standard data in all this, and puzzled it out. The 4XZ 5-number format gave up its mystery. Now it's known to be an old weather code, dating back to at least 1947.

This one isn't used much on the air any more, but it's still in all the books. It's number FM-46, also known by its old name of "IAC FLEET." IAC stands for International Analysis Codes, and "fleet" refers to its use by navy ships. "FM" stands for Field Meteorological, on the long list of similarly numbered FM codes maintained by the World Meteorological Organization, a United Nations agency.

FM-46, currently in its FM-46-IV revision, is a greatly condensed version of a larger code called FM-45, with old name of "IAC." It's one of several codes that are so concise that they even leave out their own designators at the beginning, further confusing listeners.

Let's do a little traffic analysis ourselves. Following the usual CW traffic headers and such, every FM-46 message will always begin with 10001 or 65556. 10001 indicates that

the data is to be used for surface analysis (the weather chart), and 65556 means it's for a surface prognosis (the weather forecast).

The rest of the preamble consists of a position group, and then a date/time group beginning with a 0. If the preamble started with 65556, there'll be a second time group, which is an hour offset for the valid time of the forecast.

The preamble ends with another break sign. There will then be as many following sections as are necessary to send the data. These sections are standard, and begin with 999xx, 888xx, or 777xx.

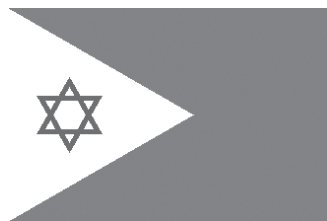
The end of a data set will always be 19191, another sure tip-off.

As mentioned, this is an old code, best suited to Morse telegraphy, but that doesn't mean it's not a good one. The numbers expand to huge amounts of information, the precise nature of which varies with the section of the message. It is even possible to encode isobars, those squiggly lines of equal barometric pressure around the "H" and "L" on the weather chart. A trained decoder can produce a very complex looking chart, almost as if it had been faxed or e-mailed.

Newer weather codes do something similar, but the trend is toward plotting the information from raw data, in "gridded" format or even encoded binary (computer ones and zeroes). Both of these also look like gibberish, but a different sort of gibberish.

Everyone knows it's a pain copying long strings of numbers in CW, but it's good practice for you or your computer. Those wanting to bang their heads up against some more FM-46 code can get the whole standard, starting on page 105 of WMO Publication 306, Part A. The whole 492-page document is available in Adobe Acrobat form on the Internet. It's a good thing to have around, because it also explains more commonly encountered formats, such as TAF (Terminal Aerodrome Forecast) and METAR (Aviation Routine Weather).

Several of these weather codes have always been on this column's web site. FM-46 was not one of them, but it has recently been added. Happy decoding.



ABBREVIATIONS USED IN THIS COLUMN

AFB	Air Force Base
ALE	Automatic Link Establishment
AM	Amplitude Modulation
ARQ	Automatic Repeat Request teleprinting system
ARQ-E3	French single-channel ARQ teleprinting system
AWACS	Airborne Warning And Control System
CAMSLANT	Communication Area Master Station, Atlantic
CAMSPAC	Communication Area Master Station, Pacific
CW	Morse code telegraphy ("Continuous Wave")
DEA	US Drug Enforcement Administration
DGPS	Differential Global Positioning System
DSC	Digital Selective Calling
E3	UK Lincolnshire Poacher numbers, Cyprus
E3a	UK Cherry Ripe, like Poacher, Guam
E4	Old designator for E3a
EAM	Emergency Action Message
FAX	Radiofacsimile
FEC	Forward Error Correction teleprinting system
GRID	Gridded weather observations, sent as text code
HFDL	High-Frequency Data Link
HF-GCS	High-Frequency Global Communications System
JIATF-S	US Joint Interagency Task Force, South
M8	Cuban numbers, Morse code version of V2
M22	4XZ, Israeli CW "numbers" and weather
MARS	Military Affiliate Radio System
Meteo	Meteorological
MFA	Ministry of Foreign Affairs
MSK	Minimum Shift Keying
MWARA	Major World Air Route Area
MX	Russian single-letter beacons/channel markers
RSA	Republic of South Africa
RTTY	Radio Teletype
S28	UZB76, Russian numbers with buzzy marker
S30	Russian numbers with beep marker
SECURE	State Emergency Capability Using Radio Effectively
SITOR-A	Simplex Teleprinting Over Radio, ARQ mode
SITOR-B	Simplex Teleprinting Over Radio, FEC mode
UK	United Kingdom
Unid	Unidentified
US	United States
V2	Cuban numbers, Spanish callup "Atencion!"
VOLMET	Scheduled broadcasts of airport weather
XP	Russian "Polytone," tone-coded numbers

All transmissions are USB (upper sideband) unless otherwise indicated. All frequencies are in kHz (kilohertz) and all times are UTC (Coordinated Universal Time). "Numbers" stations (encrypted, usually unidentified, broadcasts thought to be intelligence-related) are identified in () with their ENIGMA station designators, as issued by the European Numbers Intelligence Gathering and Monitoring Association.

291.0	439-DGPS beacon, Wormleighton, corrections and almanac in MSK, at 1930. (Day Watson-UK)
299.0	460-DGPS beacon, La Hague, corrections in MSK, at 1924. (Watson-UK)
307.5	440-DGPS beacon, St. Catherines Point, corrections in MSK, at 1936. (Watson-UK)
309.5	449-DGPS beacon, Nash Point, corrections and almanac in MSK, at 1915. (Watson-UK)
1698.0	La Coruna Radio, Spain, running crew phone patches in Spanish, at 2215. (Patrice Privat-France)
2182.0	SPS-Witowo Radio, Poland, announcing upcoming navigation warnings on 2720, at 2134. (Privat-France)
2582.0	Bermuda Harbor Radio-Bermuda Marine Information Bulletins, at 0038. (Ron Perron-MD)
2598.0	VOJ-Canadian Coast Guard, Port-au-Basques, NFD, weather in English and French, at 0209. (Perron-MD)
2670.0	Coast Guard Group Moriches-US Coast Guard, NY, Marine Information Broadcast at 0028. (Perron-MD) NMN13-US Coast Guard Group, Cape Hatteras, NC, Marine Information Broadcast, at 2345. (Watson-UK)

2680.0	4XZ-Israeli Navy, Haifa (M22), CW marker, simulkeying on 4241, 4331, 5159, 6739, 8103, and 10046, all at 2148. (Ary Boender-Netherlands)
2749.0	VAR-Canadian Coast Guard, Fundy, with weather and fishing warnings in English and French, at 1048. (Perron-MD)
2872.0	Gander-MWARA North Atlantic net B, Canada, working KLM 471, at 0248. (Perron-MD)
2962.0	Santa Maria-MWARA North Atlantic net, weather for unheard aircraft at 0500. (Barry Williams-AL)
3016.0	Santa Maria-MWARA North Atlantic net A, working Delta 118 at 0207. (Perron-MD)
3336.2	"L"-CW single-letter channel marker, "solitary" type (MX), Tirana, Albania, at 2116. (Boender-Netherlands)
3413.0	Shannon VOLMET, Ireland, aviation weather at 0412. (Williams-AL)
3485.0	Gander VOLMET, NFD, North Atlantic aviation weather, simulcast on 6604 and 10051, at 2350. (Ken Maltz-NY)
3495.0	"C"-Russian CW single-letter beacon, "cluster" type (MX), Moscow, sent faster than normal, also on 4558, 5154, and 7039, at 2157. (Boender-Netherlands)
3756.0	"The Pip"-Regular CW ticks (S30 marker), at 2140. (Boender-Netherlands) [Formerly XT, The Pip was reclassified from an oddity to a real numbers station after a Slavic male voice appeared. - Hugh]
3828.9	"The Squeaky Wheel"-Weird channel marker, possibly Russian, unknown mode at 2201. (Boender-Netherlands)
3881.0	FAV22-French Army, Mont Valerien, CW Morse code practice with exercises and text, at 0940. (Watson-UK)
4027.0	Unid-Cuban AM female voice in Spanish (V2), 5-number groups at 0528. (Perron-MD)
4035.0	Cuban AM Spanish "female" (V2), 5-number groups at 0408. (Williams-AL)
4223.5	Papa Charlie-US military, working Kilo at 0812. (Jeff Haverlah-TX)
4319.0	Cuban "Cut Numbers" station (M8), CW letter substitution groups at 0442. (Perron-MD)
4369.0	WLO-Mobile Radio, AL, announcements and weather at 0507. (Perron-MD)
4435.0	9AR-Rijeka Radio, Croatia, Slavic voice tape at 2150. (Privat-France)
4585.0	Kitty Hawk 423-US Civil Air Patrol, NC, working Kitty Hawk 30 and Jefferson 26 (VA), at 2305. (Perron-MD)
4604.0	Columbus 1-Civil Air Patrol, OH, net with Columbus 4, Kentucky CAP 54, and Red Bird 24 (MI), at 2350. (Perron-MD)
4625.0	"The Buzzer"-Noisy Russian marker (S28), tone keying at 2100. (Boender-Netherlands) [Formerly XB, another oddity now considered a Slavic numbers station, because voice has been heard. - Hugh]
4739.0	Fighting Tiger 22-US Navy aircraft, working Goldenhawk (Tactical Support Center, ME) at 0044, then Fiddle (USN, FL), at 0105. (Mark Cleary-SC)
5088.5	USAIS1012-US Army/government weekly net, calling USANG2409 in ALE, also used 6985, 7448.5, and 7510, at 1607. (Perron-MD)
5339.0	MIW2-Israeli Intelligence (E10a), AM null-message format, at 2015 and 2210. (Boender-Netherlands)
5465.8	"R"-Russian CW single-letter channel marker, "solitary" type (MX), Izhevsk, at 1959. (Boender-Netherlands)
5696.0	NMC-US Coast Guard CAMSPAC Pt. Reyes, CA, working Coast Guard 1704, at 0049. (Rick Baker-OH) "B-6-S"-JIATF-S, working CAMSLANT at 0200. (Cleary-SC)
5708.0	Reach 3079-US Air Force Air Mobility Command, ALE-initiated voice patch to Hilda Global, at 2046. (Cleary-SC)
5732.0	Coast Guard 1502-US Coast Guard, patch via Service Center (US Customs) to JIATF-S, at 2242. (Cleary-SC)
5738.0	Polytone-Weird AM station (XP), 5-number groups in sequential tones, at 2120. (Privat-France)
5746.0	Lincolnshire Poacher-UK intelligence (E3), callup "87133," simulcast on 6959, at 2208. (Boender-Netherlands)
6234.5	NMN-US Coast Guard CAMSLANT Chesapeake, VA, unsuccessfully trying to go secure with Coast Guard 1712, at 1712. (Baker-OH)
6235.0	Bravo Foxtrot, link-11/16 tracking coordination at 1428. (Cleary-SC)
6379.0	4XZ-Israeli Navy, Haifa (M22), encrypted CW message in 5-letter-groups, then back to marker at 1450. (Watson-UK)

- 6550.0 PBDO-Dutch Coast Guard vessel *Visarend*, working Coast Guard 03 at 1331. (Boender-Netherlands)
- 6604.0 Gander VOLMET, NFD, North Atlantic aviation weather, simulcast on 10051 and 13270, at 1305. (Maltz-NY)
- 6712.0 5115-French Air Force, position for Circus Vert, Villacoublay, at 1638. (Privat-France)
- 6765.0 AAR7AL-US Army MARS, Central Region Coordination Station, checking AAT7WE into a net at 2349. (Baker-OH)
- 6825.0 FAV22-French Army, Mont Valerien, CW marker for code practice here and 3881, then letter-group exercises at 0931. FAV22, slow encrypted CW message, then text in French, at 0950. (Watson-UK)
- 6959.0 Lincolnshire Poacher UK intelligence (E3), numbers groups at 2245. (Cleary-SC)
- 6985.0 USAIS1012-US Army/government weekly net, calling USAMC2120 in ALE, at 1647. (Perron-MD)
- 7508.0 ZSJ-South African Navy, Silvermine, FAX weather forecast at 1100. (Bob Hall-RSA)
- 7510.0 USAIS1012-US Army/government weekly net, calling USAPC1010 in ALE, at 1628 and 1634. (Perron-MD)
- 8000.0 4XZ-Israeli Navy, Haifa (M22), with coded weather observations in CW, at 1641. (Watson-UK) [Yes, some apparent M22 "numbers" traffic is actually a weather code. -Hugh]
- 8103.0 4XZ-Israeli Navy, Haifa (M22), CW marker at 2153. (Perron-MD)
- 8152.0 Cruiseheimer Net-Control station working various small vessels in Atlantic and Caribbean, at 1330. (Perron-MD)
- 8414.5 GBQM-UK cruise ship *Queen Mary 2*, routine DSC call (on the alert channel) to vessel *Tyco Decisive* (V7D17), went to 2182, at 0116. (Watson-UK)
- 8602.0 Cuban "Cut Numbers" station (M8), CW code groups in progress at 2333. (Perron-MD)
- 8670.0 IAR-Rome Radio, Italy, CW announcements at 0110. (Perron-MD)
- 8971.0 Golden Hawk-US Navy, ME, working Trident 743 at 1316. (Baker-OH)
- 8980.0 Coast Guard 2118-US Coast Guard, patch to Group New Orleans via CAMSLANT, at 2122. (Cleary-SC)
- 8983.0 Coast Guard 1503-US Coast Guard, telling CAMSLANT they have radio guard with JIATF-S, at 2300. (Cleary-SC)
- 9341.7 Unid-Egyptian MFA, Cairo, SITOR-A call to TVVC (Baghdad, Iraq), no joy, at 1547. (Watson-UK)
- 9360.0 OXT-Copenhagen Meteo, Denmark, callup in frequency-shifted Morse, then a FAX ice chart, supposed to have been discontinued at this station, at 1155. (Watson-UK)
- 10046.0 4XZ-Israeli Navy, Haifa (M22), with CW weather codes, then back to marker at 1545. (Watson-UK)
- 10100.8 DDK9-Hamburg Meteo, RTTY navigation warnings in English and German, at 1723. (Hall-RSA)
- 10373.6 NODY-US Coast Guard Cutter *Acacia*, calling GGD9, District 9, OH, in ALE, also on 07621.6, at 1643. (Perron-MD)
- 10555.3 VMW-Wiluna Meteo, Australia, clear FAX weather chart at 1520. (Hall-RSA)
- 10945.0 CFH-Canadian Forces, Halifax, NS, RTTY marker giving listening frequencies 2822, 3394, 4158, 6254, 8303, 12380, 16576, and 22182, at 1915. (Watson-UK)
- 11039.0 DDH9-Hamburg Meteo, RTTY weather in German, then back to marker at 1010. (Watson-UK) DDH8/9-Hamburg Meteo, RTTY test loop, simulkeying on 14467.3, at 1707. (Hall-RSA)
- 11175.0 Chalice Hotel-US military AWACS, calling Pig Iron, no joy at 1554. Doom 91-US Air Force, unsuccessful call to Mainsail (any ground station), at 2034. Doom 93, calling Mainsail and raising Puerto Rico HF-GCS, went to 13200, no joy there, at 2055. (Haverlah-TX)
- 11184.0 SU0265-Aeroflot Airbus A319, attempting to get Zurich weather via HFDL, at 0950. (Privat-France)
- 11206.0 LOV-Argentine Navy, Ushuaia, encrypted RTTY 5-letter-group message, then weather in GRID code, at 2040. LOV, with plaintext weather in Spanish, at 2047. (Watson-UK)
- 11229.0 Bank Witch-US military, calling Necessary, no joy at 2000. (Dwight Simpson-WI)
- 11232.0 Shadow 38-US Air Force C-130, patch via Canadian Forces Trenton Military to Coyote Ops and Kirtland AFB Meteo, at 1836. (Simpson-WI)
- 11244.0 Chalice Hotel-US military AWACS, calling Fortunate, no joy at 1708. (Haverlah-TX)
- 11253.0 Unid-UK Royal Air Force, continuous VOLMET at 0430. (Williams-AL)
- 11387.0 Sydney VOLMET-Australian voice synthesized aviation weather, at 0734. (Perron-MD)
- 11545.0 Lincolnshire Poacher-UK intelligence (E3), in progress at 2017. (Boender-Netherlands)
- 11563.0 Unid-Spanish 5-number groups, AM but buzzy audio and no carrier between groups, at 0340. (Williams-AL) [Sounds like another bad night in Cuba. -Hugh]
- 12579.0 Unid-US Navy, Yokosuka, Japan, weather in SITOR-B for Arabian Sea and Indian Ocean, at 1535. (Hall-RSA)
- 12603.5 SVO5-Olympia Radio, Greece, Greek SITOR-B maritime news, at 1320. (Watson-UK)
- 12735.0 URL-Sevastopol Radio, Ukraine, fast CW to vessel *Konstruktor*, at 1550. (Watson-UK)
- 12745.5 JJC-Tokyo Radio, slow (60/576) Kyodo newspaper FAX in Japanese, at 1600. (Watson-UK)
- 12763.5 DAO12-Kiel Radio, Germany, CW identifier every 3 minutes, at 1606. (Watson-UK)
- 12903.0 VTH1/5/7-Indian Navy, Bombay, RTTY messages to warships in 4-letter code groups, at 1712 and 2014. (Hall-RSA)
- 12965.0 UUSJ-Ukrainian vessel *Vadim Glazunov*, working USO5, Izmail Radio, in CW at 0945. (Privat-France)
- 13050.0 UDK2-Murmansk Radio, Russia, third-shift Cyrillic RTTY traffic, then working ships in CW, at 1405. (Watson-UK)
- 13155.0 Shin Bone-US military, 28-character EAM simulcast on 6697, 8992 and 11244, at 1609. (Haverlah-TX)
- 13375.0 Cuban "Cut Numbers" station (M8), CW letter substitution code in progress at 1825. (Perron-MD)
- 13444.0 RFQPT-French Forces, Djibouti, ARQ message in French to RFFNC, French naval base at Lorient, at 1545. (Hall-RSA)
- 13510.2 CFH-Canadian Forces, Halifax, NS, clear FAX weather chart at 2019. (Hall-RSA)
- 13927.0 Reach 268-US Air Force, patch via MARS AFN2AC to Westover, ordering 18 pizzas, at 1806. (Cleary-SC)
- 14467.3 DDH8-Hamburg Meteo, Germany, RTTY traffic in German, at 0935. (Watson-UK)
- 15867.0 Coast Guard 15C-US Coast Guard helicopter, working Panther (DEA, Bahamas), at 1932. (Cleary-SC)
- 16806.5 NRV-US Coast Guard, Guam, SITOR-B gale warnings for Sea of Japan at 1525. (Hall-RSA)
- 16976.5 PWZ33-Brazilian Navy, Rio De Janeiro, RTTY weather and information in Portuguese, at 2145. (Perron-MD)
- 17010.0 ERMGRD-Brazilian Navy, Rio Grande, calling FTEROI (Frigate *Niteroi*) in ALE, at 0049. (Perron-MD)
- 17069.7 JJC-Tokyo Radio, Japan, FAX Kyodo newspaper in Japanese, also on 12745.5, at 1515. (Hall-RSA)
- 17362.0 WLO-ShipCom, Mobile, AL, voice-synthesized "female" announcing availability for commercial phone patches and Telexes, at 2000. (Maltz-NY)
- 17982.0 "Aircraft 2427"-Brazilian Air Force, unsuccessfully calling Belem, Galeao, Manaus, Aquarius, Tamoio, and (possibly) Profeta, all in Portuguese, at 2130. (Perron-MD)
- 18004.0 4XZ-Israeli Navy, Haifa (M22), encrypted CW message in 5-letter-groups, at 1450, coded weather sent later. (Perron-MD) [New frequency for this one. -Hugh]
- 19131.0 Flint Base-DEA Air Ops, Dallas, TX, working Flint 543, DEA aircraft landing in Laredo, TX, at 1900. (Perron-MD)
- 19441.7 5YE-Nairobi Meteo, Kenya, 100 baud RTTY test loop at 1800. (Hall-RSA)
- 19884.0 Cherry Ripe-UK intelligence numbers (E3a/E4), female voice with 5-number groups, at 0108. (Perron-MD)
- 20678.0 R26301-US Army helicopter, ALE sounding at 1207. (Privat-France)
- 20890.0 Coast Guard 28C-US Coast Guard helicopter, vessel tracking with Panther (DEA, Bahamas), at 1925. (Cleary-SC)
- 20906.0 NBGNGB-US Army National Guard, ALE sound at 1516. (Perron-MD)
- 22376.0 NMC-US Coast Guard CAMSPAC, CA, weather in SITOR-B, also NMO, HI, at 2040. (Perron-MD)
- 24711.7 RFTJ-French Forces, Dakar, Senegal, with ARQ-E3 idler at 1621. (Hall-RSA)
- 26441.7 RFFA-French Ministry of Defense, Paris, with ARQ idler at 1445. (Hall-RSA)

Gulf of Maine CODAR

Back in the July 2003 issue of *MT*, we profiled the various CODAR (ocean sensing radar) stations located throughout the US coastline and how they can be heard on your shortwave radio. Among the largest of these CODAR networks is that operated by Rutgers University from various sites on the coast of New Jersey and Massachusetts.

I recently came across the webpages operated School of Marine Science at the University of Maine which also appears to be running an expanding network of CODAR stations that can be heard on HF radio. The map in Figure 1 shows the current and proposed sites providing coverage across the Gulf of Maine.

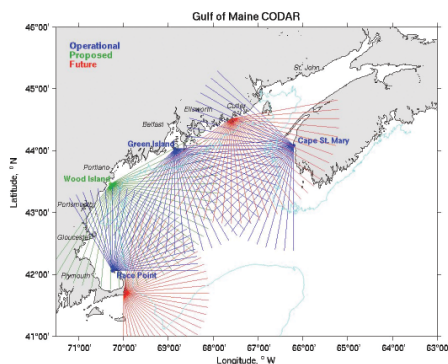


Figure 1: Gulf Of Maine CODAR sites

A check of the FCC database shows at least one experimental license granted to the Maine's School of Marine Sciences using callsign WC2XQH. The license details only one site at Heron Neck Lighthouse, Vinalhaven, ME.

The operating frequencies are given as 4440-4490kHz, 4580-4630, 4750-4800, 4830-4880 and 4920-4970 kHz.

Updates at UMC

I'm indebted to Mike Agner who finally did in a few weeks what I still hadn't gotten around to: adding a few pages to Utility Monitoring Central covering digital decoder Hardware, Software and Links to other websites of interest.

Mike's Hardware page provides links to as many hardware-based HF decoders as he has been able to track down over the years; many of course still provide sterling service to their owners despite their vintage. Naturally, the Software page covers decoders implemented as computer software, soundcard-based systems and some hybrids using a combination of software and minimal hardware interface unit.

The Links page covers key retailers, publishers of HF radio guides, mailing lists and other important places on the web. Point your web

browser at UMC and take a look for yourself.

Stan Scalsky, for a few years your co-author of this column, is also busy working on a new release of the Digital Signals FAQ. This legendary document, currently housed at the WUN website, is a comprehensive guide to HF digital systems that has been seen on the training curricula and operating desks of many of the world's top signals intelligence organizations. Now, somewhat long in the tooth, and predating the shift to HF PSK systems that has taken place in recent years, an update has been long-awaited by digital enthusiasts everywhere. Hopefully Stan will be finished some time soon.

Decoder Round Up

It's probably time that we surveyed the world of digital decoding equipment and let you know of the latest developments.

Hoka have updated their top-of-the-line **Code300-32 system** which now offers bitstream output, enhanced audio recording functions and the ability to send multiple inputs to a selection of decoding modules. This latter function is quite interesting since it allows for diversity decoding by feeding the different signals from two separate receivers and antennas tuned to the same frequency. The new version of software can also be remotely controlled via a TCP/IP from a LAN connection.

For those Mac enthusiasts among you, Black Cat Systems' **Multimode v4.5.0** now offers CW, RTTY, Slow Scan TV, Fax, SITOR-A & B, NAVTEX, ACARS, AX.25 Packet Radio, PSK31, MIL-188-141A ALE, DTMF, EIA, CCIR, ICAO SELCAL, CTCSS, Hellschreiber and LORAN-C decoding. At US\$89, Multimode is not a bad proposition for those of you with the wonderful Apple OS X operating system.

Skysweep Technologies have also updated their offering for Windows operating systems and split their product line-up at the same time. **Skysweeper Lite** is the name of the base offering and is tailored towards those interested in listening to amateur digital modes. Lite offers decoding of CW, RTTY, PSK31, PSK63, PSK125, MFSK16, 2MFSK16, 4MFSK16 and SkyBoost modes. Lite will set you back a very reasonable EU39 (about US\$50).

Skysweep's **Standard** package offers ACARS, AX.25 packet, DGPS, GMDSS/DSC (HF), GMDSS/DSC (VHF), HF DL (HF ACARS), HF-FAX, MIL-STD-188-141A ALE, PACTOR-1, ICAO SELCAL, SITOR-A (AMTOR), SITOR-B (NAVTEX), SHIP, SYNOP and WEFAX (NOAA/TIROS). These are in addition to the modes supported by the Lite package. Standard also includes a number of useful DSP (Digital Signal Processing) func-

tions to clean up, filter and "denoise" your signal of interest. Standard is priced at about US\$100. Figure 2 shows the software decoding a DGPS navigation signal.

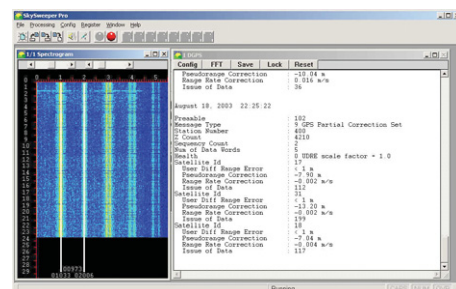


Figure 2: DGPS Screenshot

The **Skysweep Standard Plus** package adds Coquelet-8 and 13, Piccolo-6 and 12 and the Russian Intelligence and Diplomatic Service CROWD-36 system in addition to more filtering and DSP tools. Standard Plus will set you back about US\$250.

Finally, the **Professional** system adds many generic, configurable decoders to the mix making for a very flexible set up at a cost of about US\$630.

Perhaps most interestingly, the company also plans to add MIL-188-110A and STANAG4285 capabilities to the Standard Plus and Professional packages. It will be interesting to see the first of these complex modes in a moderately priced package.

Wavecom appear to have added various INMARSAT modes, MIL-188-110B (Appendix C), Globe Wireless versions of PacTOR and Clover and NATO STANAGs 4285, 4415, 4529, 4539 and 5066 to the complement of modes supported by their **Professional** series of decoders. A very nice mix of modern systems.

Until next month, enjoy your listening and feel free to write or email with your questions and comments.

Resources

Gulf of Maine CODAR System
<http://gyre.umeoce.maine.edu/gomoos/codar>
 Hoka Code 300-32
<http://www.hoka.net/code300-32/code300-32.htm>
 Multimode
<http://www.blackcatsystems.com/software/multimode.html>
 SkySweeper
<http://www.skysweep.com>
 Utility Monitoring Central
<http://www.chace-ortiz.org/umc>
 Wavecom <http://www.wavecom.ch>

Neat New Websites

Tests of Computer Noise Effects on SW Radios

Steve Waldee has compiled a systematic report on various computer gadgets as they affect my shortwave radios: "ferrite RF suppressers" that so many people have recommended have little effect. Instead use systems that have low intrinsic noise generating capacity, especially displays with excellent RF noise-avoidance design; be cautious of some types of unshielded power supplies used in certain routers and peripherals; and employ a *balanced* antenna system and shielded, well-grounded coax:

<http://www.home.earthlink.net/~srw-swling/sw-comput.htm>

Jamming

Bernd Trutenau and Sergei Sosedkin recommend this: Rimantas Pleikys, author of the books "Jamming" and "Radiotsenzura" and his team at Radio Baltic Waves in Vilnius, Lithuania, have opened a comprehensive website with material about the past and present of jamming:

<http://www.radiojamming.info>

Clandestineradio.Com Relaunch

<http://www.clandestineradio.com>

Martin Schöch tells us that ClandestineRadio.com has been re-launched. "Over the past year we have worked hard to develop a unique content management system from scratch that delivers information and data in a more sensible and accessible fashion than before. It will remain a free service to archive and, when possible, analyze the living history of these mysterious and elusive broadcast outlets."

To visit the group on the web: <http://groups.yahoo.com/group/crwatch/>
Also check out link to Martin's *QSL Information Pages* (QIP)

DX ASIA

<http://www.dxasia.info>

Media Network advises: Alok Dasgupta and Victor Goonetilleke are pleased to announce the launch of their new Web site, DXAsia. The aim is to provide accurate and timely schedule information for listeners interested in radio broadcasting to and from the South Asian region: India, Pakistan, Bangladesh, Sri Lanka and surrounding countries.

ALASKA KNLS Construction Update: The effort to install a second antenna system and transmitter at the Anchor Point site went very well last summer. All tower and antenna foundations were completed and electrical service put in place. During the winter months the interior of the transmitter building was refurbished and space cleared for new equipment to arrive in the spring. A new Continental transmitter is being built and scheduled for delivery soon. It is planned that the tower be installed during July and the antenna be erected in September of this year (*Alaska Calling*, Jan via BC-DX)

ANGOLA On 7216.8, R. Nacional, Luanda, at 1445-1500, vernacular with local rhythmic music and some talks, fair but weak. Must be using small fraction of rated 100 kW as barely audible here most of the time. 11955v not heard lately, irregular at best. So the only active Angolan SW frequencies are 4950 and 7216.8, different programs (Vaclav Korinek, RSA, DSWCI DX Window)

AUSTRALIA Dreams and goals at HCJB: by the end of May to start broadcasting to East Asia – China, Hong Kong, Taiwan, etc. Waiting for an antenna to be developed, then begin morning broadcasts to there. Later in year with second transmitter on line, will begin extensive evening broadcasting to EAs as well. Towards end of 2005, hope to have first digital transmitter available, and doing some digital broadcasting into SEAs, Singapore, Kuala Lumpur, Hong Kong, Bangkok, where all the young technocrats are, first in world to buy digital receivers. Plans a dedicated youth service, for the teeming millions of young people in that part of world (Dennis Adams, HCJB Australia, on DX Partyline)

BAHRAIN 9745 at 1322-1325, Radio Bahrain, Abu Hayan with good signal, really USB, audible as distorted signal in AM (SSS in Sotkamo, Finland, hard-core-dx online log) 9745-USB, R. Bahrain, 1207 very weak, much better at 1335 with news read rapidly by man with fanfare in the background. Quick IDs 1344 as "Itha' Bahrain." (Hans Johnson, Naples FL, Cumbredx)

BRAZIL Since Dec 18, Rádio Municipal, de São Gabriel da Cachoeira, Amazonas, 3375, is off the air, leaving the frequency open for the other Brazilian, Rádio Educadora, de Guajará-Mirim, Rondônia. Paulo Roberto e Souza, Tefé heard it at 0940-1006 with "Brasil Caboclo", sertaneja music, greetings to listeners; report to educadora@osite.com.br

There are still two stations on 4885, as Sarmento Campos notes: Rádio Difusora Acreana, de Rio Branco, Acre and R. Clube do Pará, Belém, at 2325 the former with religious programming, the latter with jesting music (Célio Romais, Panorama, @tividade DX) Rádio Clube do Pará, good from 0250 until 0400* leaving Acreana in the clear on 4885, good until it signed off at 0502 (John Sgrulletta, NY, Cumbredx)

CANADA RCI is repositioning programming to provide listeners with a unique North American perspective that embraces the world, with an eye to better meet-

ing the expectations of foreign audiences. Starting in March, RCI's lineup will include new Portuguese programming specially tailored to Brazilian audiences, bringing RCI's languages to nine. Specific programs will be aired for French-speaking listeners in North and sub-Saharan Africa, and for English-speakers in sub-Saharan Africa and India (RCI website)

Abandoning the principle of multi-target or generic broadcasts in English and French – adopted as a necessary evil after the massive cuts of 1991 – RCI will again produce broadcasts specifically targeted for the region to which they are beamed. The best of CBC/Radio-Canada programming will be beamed to the Americas, where it is already known and popular, allowing RCI to concentrate its own production resources in English on Europe, Africa and India. A seamless mix of news, field reporting, analysis, dialogues, and opinion is due to be completed by April 2005 (Andy Sennitt, Media Network blog)

Portuguese to Brazil will return, but may not be on shortwave. New language will be "paid for" by cuts to Ukrainian service. Targeted programming for Europe, Africa, India, Mid-East, but not the U.S. (Bill Westenhaber & Sheldon Harvey, CKUT International Radio Report, notes by Ricky Leong) Portuguese was dropped from SW only a year or two ago

CHINA [non] CRI's Spanish broadcast at 2200 UT on 13700 is definitely coming via Sackville, since I caught fragments of the RCI IS before the carrier was cut at 2259, unlike some other occasions when there was no such clue. Broadcast closed with schedule giving wavelengths in metres (to two decimal places, not just bands!) Do they really think any significant fraction of their audience now has radios calibrated in meters? CRI Portuguese relay at 2300 on 13650 is surely via Cuba, poor quality with audio fading in and out, crosstalk from CRI English one day, Chinese another (Glenn Hauser, OK, DX Listening Digest)

COLOMBIA 2020.18 kHz, HJZD, Radio Panzenú, Montería, at 1020, frequent IDs and ads, 2 x 1010 (Björn Malm, Quito, Ecuador, SWB América Latina) 2020.19 (tentative), HJZD, at 0946-1054*, many mentions of "Montería", abrupt sign-off at 1054 in mid talk, good signal until fade at 1000 (Mark Mohrmann, VT, DX Listening Digest)

5019.64, Radio Net, Quibdó at 0330, a very rare station but active one Monday evening with, as always, news. Was previously known as Ecos del Atrato, but very difficult to get that ID (Björn Malm, Quito, Ecuador, SWB América Latina) This station is the "queen" of relays, of various Caracol networks – Caracol Básica, Radio Reloj, Tropicana Estéreo, La Vallenata, etc. Very irregular on SW; had not heard it for months. Also is one of the worst verifiers (Rafael Rodriguez, Bogotá, Conexión Digital) Beware of Peruvian on almost same frequency **CONGO DR** 5066.330 at 1715, unID, most likely La Voix du Peuple, Bunia. Choir singing, sometimes talk in French. Heard regularly, weak and close down usually at 1730-

*All times UTC; All frequencies kHz; * before hr = sign on, * after hr = sign off; // = parallel programming; + = continuing but not monitored; 2 x freq = 2nd harmonic; B-03=winter season; [non] = Broadcast to or for the listed country, but not necessarily originating there; u.o.s. = unless otherwise stated*

1735. Varies circa 10 Hz in frequency from day to day (Stig Adolfsson, Sweden, *SW Bulletin*)

COSTA RICA "Last November, the United Nations stood idly by while a band of armed men shut down Costa Rica's Radio For Peace International...." So begins an article by "Earth Island Journal" and "The Edge" on the eviction of RFPI by the University for Peace. Read the full text by visiting the link at the RFPI website: <http://www.rfpi.org> (Joe Bernard, RFPI)

From *The Edge* story about what happened to RFPI: The standoff lasted 5 months; RFPI staff were protecting \$400,000 worth of equipment. Finally in early November was forced off the air by machete-wielding university personnel who cut the power cables. However, a UPAZ groundskeeper refused to cut the antenna tower guy wires. RFPI quickly got support from R. Habana Cuba, and Pacifica, and also, listeners aboard yachts cruising in the Caribbean, which RFPI had never known about. Even before this, Maurice Strong was purging members of the faculty and board at UPAZ who didn't agree with him. After numerous appeals, UN Secretary General Kofi Annan finally responded and instructed staff of the local UN Development Program office to intercede and resolve the standoff. But when UNDP contacted the University, UPAZ refused to negotiate. James Latham says the UN backed off from the dispute (Glenn Hauser, *DX Listening Digest*)

RFPI and partner to offer month-long Peace Journalism/Spanish language courses – a study partnership with the San José-based Institute for Central American Development Studies, Central America's leading language institute. Interested participants will enroll in a course combining the concept of Peace Journalism with Spanish language studies. As in the past, proceeds from the course will assist in the upkeep of Radio For Peace International. Courses set to begin in March 2004. More information: <http://www.ipccr.org> and <http://www.icadscr.com>

RFPI is planning to begin streaming audio on the Internet again in the near future, while the search continues for a new site to reconstruct our studio and install transmitting equipment to get the shortwave radio back on the air. Listeners can count on hearing a lot of their old favorite shows, as well as a new special focus on regional Costa Rican and Central American issues. As RFPI continues its reconstruction efforts, listener support is crucial – now more than ever – to keeping the station alive. You may send donations securely and immediately by clicking on the PayPal icon on our web site on <http://www.rfpi.org> or you may send a check or postal order to Radio For Peace International, P O Box 3165, Newberg, OR 97132, USA (RFPI Vista)

CUBA UT Sat at 0645, RHC 9550, 9820 was carrying a show which used to be on RFPI, *Making Contact* (gh) Not a regular feature, just something run when enough people are on vacation or are covering an event (Michael L. Semon, FL, *DX Listening Digest*)

R. Rebelde, 5025 with much stronger signal than before, at 2338 with Mesa Redonda about the five Cuban political prisoners in the US. New transmitter? (Adán González, Venezuela, *DX Listening Digest*) Also at 0954-1001, humongous signal here now. They either got a new transmitter or fixed up the old one. Must be at least 50 kW. Pounding in at \$-35+!!! Nice ID over organ music at 0959 "Rebelde, la Habana, la emisora de la Revolución" (Dave Valko, PA, *Cumbredx*)

DENMARK I have moved my Danish QSL Gallery to: <http://www.qsl.net/oz3yi/QSL.html> (Erik Kæie, ex-R. Denmark, *DX Listening Digest*)

[non] On WRN via WRMI, you can hear a weekly show in English from Denmark! *Copenhagen Calling* has been running for some eight years, since R. Denmark quit English long before they quit SW completely at yearend. In Jan it was at 0630 UT Sun on 7385, 1830 on 15725 (One hour earlier from April if still running). WRN lists it under Banns Radio International. Its own site <http://www.euroaudio.dk/> includes audio on demand (Glenn Hauser, OK, *DX Listening Digest*)

ECUADOR [and non] DX Partyline host Allen Graham is on home ministry in the US through April, entailing delays in uploading DXPL audio to the HCJB website. If you get tired of waiting for it, Alex records this and other DX programs off the air each week and makes them available at <http://www.piratearchive.com/dxprograms.htm> (gh)

unID on 6760.14 turned out to be Centro Radiofónico de Imbabura, Ibarra, at 0100, very good strength, same as on the fundamental 3380.07. Then also heard it at 0055 on 4609.99, which is the sum of 3380.07 and its MW frequency 1229.92 (Björn Malm, Quito, Ecuador, *SWB América Latina*)

EGYPT R. Cairo in English 1600-1645 (not in Zulu) on 15620, first noted on Dec 27 (Rumen Pankov, Bulgaria, BC-DX) Substitute, with Zulu department on holiday?? Please check it now (gh)

ERITREA [non] EPLF-DP announces the birth of "Voice of Liberty". To coincide with its founding congress, VOL will be launched on 22 February 2004 on 15675 at 0400-0500 UT Sundays. During the first and second quarter, transmissions will be made in Tigrinya. Work for the Arabic program is already under way (<http://www.eritrean1.org>) Via Germany?

INDIA AIR READIES AXE FOR FOREIGN BROADCAST – It's perhaps the last outpost of the Raj: a full division dedicated to radio transmission in 16 non-Indian languages at an annual cost of Rs 57 crore. Now, though, Prasar Bharati-- realizing that there may not be anyone out there actually listening to the programs – is planning to pull the plug on its External Services Division. CEO of Prasar Bharati Corporation K. S. Sarma said, "The division was set up when there was no television. Today, it takes effort to tune in to short wave. We have to overhaul the entire system first".

The first broadcast was on October 1, 1939; the British used it for wartime propaganda in languages their allies/soldiers understood well, including Pashto, Burmese, Chinese, Dari. Other languages were added over the years – including Burmese, Thai and Bahasa Indonesia – but

none was removed from service. Today, the broadcasts eat up Rs 50 crore annually on maintenance of transmitters and Rs 7 crore on software. The broadcasts are aired through 19 transmitters in the country – which, officials say, have outlived their purpose and stretched their budgets.

An old ESD hand says it isn't a revenue-generating service. The only measure of its success, he says, used to be the letters received from the world over. "There was a time when we received 300 letters a month, now we get one or maybe nothing for months".

The foreign language does lend itself to absurd situations. Officials speak of how a Persian anchor/translator insisted on airing – for an entire year – news on problems associated with the gall bladder, as he suffered from a similar complaint. The anchor was, in effect, giving free publicity to his doctor before he was discovered.

Going the cable route [webcasting] will definitely cut costs as no transmitter will be required for transmission. More important, world over, SW transmissions are being shut down giving way to far more sophisticated means of radio broadcast cutting costs in the process (newindpress.com via Swopan Chakraborty, Kolkata, *DX Listening Digest*)

Transpolar AIR will be missed on SW least of all in NAM, because they never bothered to try to reach us despite the large number of potential relay bases in Europe, Africa, and the Americas (gh)

Problem is that AIR has never given journalists the freedom to make interesting programs – it is records and talks, very little in the way of interaction. And, AIR was notorious for NEVER replying to letters – even requests for a program schedule! (Jonathan Marks, in his *Critical Distance* blog)

All India Radio HQ are currently interested in receiving reception reports on their External Services targeted towards UK & Western Europe, SE Asia, China and Middle East. The reports may be sent to: spectrum-manager@air.org.in or: Director (Spectrum Management & Synergy), All India Radio, Room No. 204, Akashvani Bhawan, New Delhi 110001. Telefax: 91-11-23421062, 91-11-23421145. QSL Cards will be issued for all correct reception reports. The External Service schedule is available at: <http://allindiaradio.org/schedule/fqsch.html> and also in <http://www.geocities.com/bcdxnet> (Jose Jacob, VU2JOS, *dx india*)

LIBERIA On 2 Feb at 1545 tune in heard Voice of Liberty in Monrovia on 11514.4 with fair signal. Later reception improved and was audible past 1800, but audio distorted at times. Sounds like they announce "LCBN Radio", also "Voice of Liberty". FM 102.3 and shortwave mentioned. Four days later, I received a jpg e-mail QSL sent by Morgan Freeman of WJIE (morgan@wjie.org). I got impression that he wants to handle the reception reports of this Liberian station and wishes the staff in Liberia not to be bothered with reports. Said it was the very first one, to be followed up in the mail. Then not heard for a few days on/around 11515, so maybe transmitter problems again (Jari Savolainen, Finland, *DX Listening Digest*)

The Swiss-based Hironde Foundation is planning to re-launch Star Radio, a unique independent media outlet located in Monrovia and broadcasting throughout Liberia until its forced closure by former president Charles Taylor in 2000. The Foundation says Star Radio's mission is to be an essential information tool to help the Liberian peace process, and it should also rapidly become a tool for the humanitarian agencies, in order to enhance better understanding among Liberian audiences of relief and protection operations (*Relief Web, Clandestine Radio Watch via Media Network* blog) On SW? From 1997 to 2000 it was on 3400 and/or 5880 but seldom reported (gh)

MALAYSIA RTM Radio 6 in Tamil, usually strong here, missing from 4845 for a couple of weeks (Jari Savolainen, Finland, *Cumbredx*) But Radio Satu in Malay still good on 5965v; Radio 4 in English strong on 7295 but often poor to unintelligible audio and frequent audio breaks. Radio Malaysia Sarawak heard on 7270, 6050, 7130, but not 4895, 5030 (Alan Davies, Indonesia, *Cumbre DX*)

MÉXICO R. Mil was on 6016 instead of 6010 for three days in January due to a technical fault (Jesús Martínez Miranda, Uruapan, Michoacán, México, XE1HMW, *DX Listening Digest*) At 0000-0100 only, BBC DRM via Sackville also moved from 6010 to 6015, perhaps following complaint from Cuba about interference to 6000; obliterating XEOI wherever it is (gh)

NETHERLANDS Someone in Northern Ireland set up a bunch of new yahoo groups centered around SW programs, past and present including <http://groups.yahoo.com/group/thehappystation/> "a new chat group for people who remember the good old days of the happy station presented by tom meyers [sic] every sunday on radio nederland [sic]" (gh and Andy Sennitt) Among those joining was Tom Meijer himself who also posted a recent photo: "I found out about this group through my former loyal secretary (Helma) who still works for RN. I am alive and kicking. Healthy, happy and spending my time (of which there never seems to be enough) doing the things I love (too many to mention)." (Tom Meijer, *Happy Station* and *La Estación de la Alegría* host from 1970 until 1993)

NICARAGUA According to a personal letter dated January 19, 2004, from Sr. Evaristo Mercado P., Director Radio Miskitu, their shortwave transmitter [5770] has been out of service since August 2003, damaged by fluctuating power supply. Dr. Freeman will visit the station in March in order to bring the transmitter back to US for repair. He will also help them to increase power of a small FM transmitter (Tetsuya Hirahara, Tokyo, *Radio Nuevo Mundo*)

PHILIPPINES On Feb 7, R. Veritas Asia held its annual listeners meeting, at Krishnanagar, Nadia, West Bengal, India, with more than 80 attending

Shortwave Broadcasting

from different parts of India and Bangladesh. Swapan Chakraborty was selected best DXer of the year 2003 and awarded a Filipino national dress along with a certificate. Proposal was also given for a commemorative QSL card for RVA's 25th anniversary next year and 400th edition of Bengali DX program "Aiker Ganamadhyaam". A big listeners meet is planned then at Chittagaoon, Bangladesh (Rajdeep Das, Kolkata, India, GRDXC)

SLOVAKIA I like Radio Slovakia International. Their programming has a hand-made quality to it. They do a lot of reports where they take microphones out on the street and capture sounds and voices live, as in their "Regional News". They have a sense of humor about what they do "in the upside down pyramid" (the RSI building in Bratislava), and the presence of a British announcer (Pete Miller) on the staff gives their descriptions of Slovak life a touch of ironic detachment. They have a cooking show on Saturdays, "Cooking with Andrea". How many of the other Eastern Europe broadcasters do that? I'm a big fan of RSI. I have listened to them regularly since 1993, and they are getting more professional without losing a personal touch. And the "QSL Gallery" on their website is nice too (Scott Walker, PA, svpprograms)

SOMALIA [non] Somali at 1200-1230 on 17565 is an educational program called "Mustaqbal". Like Sudan Radio Service, it is run by the Education Development Centre, EDC, a large US NGO that specializes in using the media to educate and inform disadvantaged communities. Good reception here in Nairobi. Wolfgang Büschel found a registration that this is via South Africa, Mon/Tue/Thu only; also supposed to air at 0630-0700 on 17565 via UAE (Chris Greenway, Kenya, BC-DX and DXLD)

SPAIN REE announces that it no longer sends QSLs. Yet, one of its programs, *Españoles en la Mar*, confirms reports sent directly to studios in the Canary Islands. QTH: R.E.E., Programa "Españoles en la Mar", Apartado 1233, 38080 Santa Cruz de Tenerife, Islas Canarias, España (José Moacir Portera de Melo, Brasil, *Conexión Digital*) Full data QSL and form letter, both in Spanish, received for 11625, plus two stickers, in 16 days for 1 IRC and an English report, V/S Mary Cortés (Scott R. Barbour, Jr., NH, *DX Listening Digest*) For B-03 until March 28 this is scheduled: Mon-Sat 1510 on 21700, 21610, 21570, 17755, 15585 y 15385; Mon-Fri 2105 on 11625 y 7275; Sat 2205 on 17850, 15125, 15110, 11625, 9765, 7275 and 7270 (Lic. Guillermo Glenn Hauser, RN Radio Enlace y Mundo Radial) Probably one hour earlier for A-04, with other changes; see website

SUDAN Sudan Radio Service in English, Arabic, Sudanese Arabic, Shona, Nuer, Dinka, Mon-Fri 1500-1700 on 15530 heard on additional 15290, both very strong (Observer, Bulgaria) No sign of 15290 here when 15530 was coming in well, with news about Sudan in English at 1515. I believe I have found the explanation, assuming 15530 is via Woofferton, UK, as reported: A leapfrog mixing product with another Woofferton transmitter halfway between, on 15410, for the IBB at 1400-1700, aimed 105 degrees (gh) SRS station manager Mike Kuenzli at their studios here in Nairobi, confirms they are on 15530 at 1500-1700, and 9625 at 0300-0500, both Monday-Friday only. Kuenzli says they hope to increase output to six hours a day by March or April (Chris Greenway, Kenya, *DX Listening Digest*)

U S A I am very sad to have let you know that we will cease our shortwave broadcasts on February 29, 2004. We are hoping that someone will come forward and purchase the station so that we may continue our broadcasts, but so far we have not found anyone. Should we be successful in finding a buyer, I will let you know as soon as I can (WSHB Station Manager via Don Putnick, *rec.radio.shortwave* via John Norfolk) It seems there was not as much demand for Christian "Science" teaching as imagined. Nothing about this was on the website still showing B-03 frequencies effective until March 27. Take a look at their photo gallery:

<http://www.ftccs.com/GV/shortwave/photo.jhtml> (gh)

Ragam, a two-hour show of Tamil music and comedy(?) was heard in January and February on WWCR-3, Sundays at 1300. 12160 was not propagating well enough to suit the client, so moved to 9985 for this broadcast only, then shifted to 1400-1600, bumping Sing for Joy from 1500 to 1300. For A-04 Ragam might be back to 1300-1500 on 12160? Check <http://www.ragamradio.com> which is extremely uninformative about who MediaWave LLC is and where. One program mentioned Malaysia; music sounds fine, but mike announcements obviously with unprofessional equipment. They recommend a \$9.95 SW radio and seek to sell advertising (Glenn Hauser, OK, *DX Listening Digest*)

World of Radio on WWCR, projected time-shifted schedule with DST from April 4: Thu 2030 15825, Sat 1030 5070, Sat 2030 12160, Sun 0230 5070, Sun 0630 3210, Wed 0930 9475. On WBCQ: Wed 2200 7415, 17495-CUSB, Sat 2030 17495-CUSB, Sun 0030 9330-CLSB, Mon 0415 7415.

You have to seek out *Secular Bible Study* on WBCQ, 7415, UT Tue 0200-0300 [0100-0200 from April] because you wouldn't normally be listening to the despicable programs before and after it. A low-key and methodical analysis of the Bible, KJV, referring to other versions, and commentaries upon it. First half Old Testament, second half New Testament. Contact info as announced at end of each segment, and I am not at all positive of the spellings: Dr. Elliott Lesser, Bible Review S.S., P O Box 31009, Phoenix AZ 85046-1009; brlradio@aol.com He does not ask for contributions, but sells his 591-page, 8.5 x 11 inch hardbound book, "The Gospels and Acts - Questions and Problems", (list \$38.95) for \$29 ppd. in US only. Transcript of any program available for \$5 (Glenn Hauser, OK, *DX Listening Digest*)

WWRB is pleased to announce the acquisition of another Harris 100 kW fully frequency agile transmitter (100C). The seller's identity cannot be released. WWRB has signed an option to purchase 4 additional 100 kW units if and when they cease operations. WWRB has 5 shortwave transmitters and 6 major individual antenna systems with these azimuths: 360 045 090 150 270 340 degrees. For more info, visit <http://www.wwrb.org> (Dave Frantz, WWRB, *World of Radio*)

[and non] Voice of the NASB, in DRM via Merlin UK, changed in Feb to 9565, Sundays 1330 UT, adding a jazz program from HCJB at 1300; due to some technical problems with the DRM transmitter during some of our programs, they are extending our Voice of the NASB series from six to nine months at no additional charge. So our contract will now end on July 18th. The analog version of the program can be heard in North America UT Sundays at 0330 on WRMI 7385 (Jeff White, *DX Listening Digest*) One or both one UT hour earlier for DST?

RFE/RL President Thomas A. Dine thanked the broadcasters and staff of six RFE/RL European language services for a "job well-done," in a message announcing the imminent end of broadcasts to those countries - Estonian, Latvian, Lithuanian, Slovak, Bulgarian, and Croatian. Acting President Bush signed on January 23 the FY2004 Consolidated Appropriations Act which eliminates broadcasting in those languages. More than 100 positions were cut at Prague, and news bureaux in Tallinn, Riga, Vilnius, Bratislava, Bucharest, Sofia, and Zagreb, effective Jan. 31. The reductions stemmed from the Bush Administration's proposal to end broadcasting to countries that are preparing to join NATO and the European Union. Congress accepted the proposal in endorsing the appropriations act (RFE/RL press release) Four days later:

With a mixture of sadness and pride, I am announcing today that VOA will end regularly scheduled programs in Bulgarian, Estonian, Czech, Hungarian, Latvian, Lithuanian, Polish, Romanian, Slovak, and Slovenian, along with many of our broadcast feeds to affiliate stations in Central and Southeastern Europe, effective February 27, 2004, in accordance with the FY 2004 federal budget, which endorsed the Administration's proposal to close these services. Other changes will affect our Ukrainian radio service, which will reduce its daily broadcast from two hours to one hour per day, beginning March 1. VOA Ukrainian will retool its programming and expand its multimedia capabilities. Finally, VOA's Armenian language broadcast staff will be reduced to two positions. A review of the Service is underway to determine how best to use its remaining resources to maximize its impact in the target region (VOA Director David Jackson, via Dan Robinson)

As the Union has exposed, the BBG is intent on attacking the English Broadcasts at the Voice of America. The first round of cuts will happen in October and will reduce the Broadcasts from 19 to 14 hours a day. The larger question is how many broadcasters and journalists they are planning on throwing out of work. They don't save much money by reducing broadcast hours. They reduce costs by throwing people out of work. They know how many they plan to throw out of work; they just are not sharing that information (AFGE Local 1812)

VENEZUELA [and non] One of the most prodigious voices in Venezuelan radio, Ezequiel Suárez Avendaño, ceased to exist Jan. 17, after a serious illness. For many years he worked as the official voice of presidential events, and was an announcer on Venezolana de Televisión and Radio Nacional de Venezuela. For those Venezuelans who use the correct time 119 telephone service; and DXers abroad hearing the timesignals of YTO 5000, and HD2IOA in Ecuador, we shall always remember him. May he rest in peace (Jorge García Rangel, Barinas, Venezuela, *Conexión Digital*)

VIETNAM [non] KWHR Hawaii carries two unrelated clandestine broadcasts called Radio Free Vietnam, both identifying as "Dai Phat Thanh Viet Nam Tui Do": Radio Free Vietnam (California based), Tue & Thu 1600-1700 on 9930. And Radio Free Vietnam (Washington based, New Orleans maildrop), Mon-Sat 1230-1300 on 9930 (Silvain Domen, Belgium, *DX Listening Digest*)

WESTERN SAHARA [non] Listening to the Polisario station on 7460 could be especially interesting now, in Arabic until 2300, then Spanish until 2400* and perhaps around 0600 (gh)

The UN Mission for the Referendum in Western Sahara (MINURSO) will be extended until April 30 if the Security Council approves the peace plan, even lacking a response from Morocco, since the Polisario Front accepted it last July. This "Baker plan" establishes a 5-year transition period during which Morocco will have sovereignty over the former Spanish colony, although institutions elected by the Saharan population would be in charge of local affairs. At the end of this period, the UN would organize a referendum of self-determination, in which it would be decided if Western Sahara would achieve independence, or continue belonging to the Kingdom of Morocco. Meanwhile, Radio Nacional de la República Árabe Saharaui Democrática will remain one of the authentic clandestine stations, presently operating its transmitter from Tindouf, Algeria (Gabriel Iván Barrera, Argentina, *Conexión Digital*)

ZIMBABWE ZBC reactivated 3306 in early Feb, an old frequency not used for several years. It is being heard in the early morning and evening. During the daytime they are still on 6045. These SW frequencies are relaying the "Radio Zimbabwe" (formerly Radio 2) service in Shona and Ndebele (Chris Greenway, Zambia, *DX Listening Digest*)

Until the Next, Best of DX and 73 de Glenn!

0000 UTC on 6055

SPAIN: Radio Exterior-Espana. English. Arts and Performances program. (Bob Fraser, Belfast, ME) 6055, 0350 // 6040. (Harold Frodge, Midland, MI)

0035 UTC on 11600

BULGARIA: Radio Bulgaria. Spanish features and music // 9500 blocked by WYFR on 9505. (Stewart MacKenzie, Huntington Beach, CA) Bulgaria Calling 15700, 1300-1315. (David W. Weronka, Benson, NC) 7300, *2200 Spanish identification. (Frodge, MI)

0048 UTC on 11780

EGYPT: Radio Cairo. Spanish interview followed by regional music at 0053, // 11755. (MacKenzie, CA)

0105 UTC on 4924.91

BRAZIL: Radiodifusora Taubate. Portuguese. Music program of pops and romantic ballads. Local time check to ID, SINPO 34333. (Arnaldo Slaen, Buenos Aires, ARG) Brazilian's audible; **Radio Cultura** 3365, 0554-0604+; **Radio Cancao Nova** (tentative) 4824.95, 2349-0004; **Radio Difusora Roraima** 4874.9, 0314-0330+; **Radio Brasil Central** 4985, 0105-0109+ (Frodge, MI) **Radio Guarujá Paulista** 5045, 2342+ (Slaen, ARG) 2325-2359. (Barbour, NH) **Radio Aparecida** 6135, 2101+. (Slaen, ARG) **Radio Inconfidencia** 6010.2, 22452-2256+. (Frodge, MI)

0110 UTC on 4950

ANGOLA: Radio Nacional. Portuguese. Rap music to discussion and phone-ins. Promo for musical festival in Africa do Sul. Plenty mentions of disco prior to newscast at 0204. SIO 3+43. (Frodge, MI) 7216.8, 1445-1500 Vernacular text to rhythmical music. (Vashek Korinek, South Africa/DX Window) 4950, 2325-2345. Portuguese music and listeners' phone-ins. "Luanda-Luanda" IDs. (Carlos Goncalves, Portugal/DX Window)

0112 UTC on 7255

MOROCCO: VOA Tangier relay. VOA News Now, // 5995 Greenville, NC. **VOA-Botswana** relay 9885, 0400 VOA News Now. (David Ross, Hamilton, Ontario, Canada) Morocco's **Radio Medi Un** 9575, 2233-2239+ station ID, best monitored in LSB. (Frodge, DXpedition)

0125 UTC on 4901.93

BOLIVIA: Radio San Miguel. Spanish. Regional news and comments to musical program. "Radio San Miguel" ID, SINPO 24332. Bolivia's **Radio Pio XII** with Aymara comments and ID. (Nicholas Eranmo, Villa Lynch, Argentina/DX Window)

0220 UTC on 5009.67

PERU: Radio Altura. Special transmission logged covering an accident in Chaupimarca, to ID. Peruvians logged; **Radio Imperial** (tentative) 4386.6, 0019+. (Slaen, ARG; Frodge, MI) **Radio Horizonte** 5019.9, 1134-1155. (Rich D'Angelo, PA/NASWA Flash Sheet) **Radio Santa Monica** 4964.97, 0945. (Tom Banks, Dallas, TX)

0335 UTC on 6010.2

COLOMBIA: La Voz de tu Conciencia. Spanish. Musical variety program. Station ID at 0343, SIO 322+. (Frodge, MI)

0335 UTC on 9770

SOUTH AFRICA: Channel Africa. Listener call-in show of fair quality. **BBC-Meyerton**, South Africa relay 21490 at 1505; 11765, 0419. (Ross, CAN) **FEBA-Meyerton** 11885, 1623-1634, best in LSB. (Barbour, NH) **Channel Africa** 3345, 0359+. (Slaen, ARG)

0403 UTC on 4910

ZAMBIA: ZNBC/Radio One. Regional vocals to vernacular talk. "Radio One" identification booming in tonight. (D'Angelo/NASWA Flash Sheet) Tentative on ZNBC 4910, 2145-2202*. (Frodge, DXpedition)

0405 UTC on 15340

NEW ZEALAND: Radio NZ Intl. Sports scores followed by national weather forecast. 9850 at 1300 with Wayne's Music program. (Ross, CAN) 9870, 1514-1518+ **News About New Zealand** program; 11980, 1805-1811; 15264, 2103-2118+. (Frodge, MI)

0406 UTC on 3340

HONDURAS: HRMI. Spanish religious program to contact info/address. Quick ID at 0415, followed by ballads and brief talk segments. (Scott Barbour, Intervale, NH) Tentative on Honduran **Radio Litoral** 4830, 1109-1115+. (Frodge, MI); 0441-0503* (Barbour, NH) **Radio Luz y Vida** 3249.34, 1121-1134. (Barbour, NH)

0858 UTC on 13840

ITALY: IRRS. Sign-on ID to English language lessons at 0900, followed by UN speech from Kofi Annan. SINPO 33333. (Bjarke Vestesen, Blommenslyst, Denmark/DX Window)

0910 UTC on 6010

CHILE: Radio Cooperativa via Radio Parinacota. Spanish. News program to national news. Identification as "Radio Cooperativa". SINPO 32432. (Slaen, ARG)

1011 UTC on 5925

VIETNAM: Voice of. Vietnamese for two males's conversation. Lady with presumed station ID over poor-fair copy. (Barbour, NH) 12020, 1235-1240+ with news and IDs. (Frodge, MI)

1256 UTC on 11500

TAJIKISTAN: Radio Rossi. Russian text to somber music tunes. Clear "Radio Rossi" identification with email address at 1300. SIO 353. (Frodge, DXpedition) **Tajik Radio** 4635, 2252-2317 in presumed Tajik service. (Barbour, NH)

1332 UTC on 9770

SRI LANKA: SLBC. Heavily accented male/female duo in English on marriage life and baby care, // 15745 covered by Spanish station. (Frodge, DXpedition)

1400 UTC on 6035

BHUTAN: Bhutan BS. World news in English and return to local music program. First time noted English news on a Sunday at 1400. (Swoopan Chakroborty, Kolkata, India/DX Window)

1413 UTC on 9560

THAILAND: Radio. English segment on Thai exports to ID and time check at 1417. Audible 9810, 1230. (Frodge, MI) 9680, 0012. (MacKenzie, CA) 9535, 2038-2046+; 9810, 1250-1300+. (Frodge, MI) 9535, 1955-2002; 6040, 1136-1148 (Barbour, NH)

1450 UTC on 17820

CANADA: Radio Canada Int'l. *Sounds Like Canada* show featuring problems with ATVs. (Fraser, ME) **RCI** 9770, 2110-2125 // 11835, 13650 fair. (Barbour, NH)

1506 UTC on 15205

GREECE: VOA relay. News Now program of fair quality. (Ross, CAN) **Voice of Greece**, Greek service 9420 at 2040 // 17705. (Fraser, ME) **VOG** 12105, 1626-1632+ ID as "Radio Athena" at 1630. (Frodge, DXpedition) **Radio Thessaloniki** 9935, 1430-1530. Greek music, local talk to ID 1459, fair-good. (Joe Talbot, Red Deer, Alberta, Canada/DX Window)

1515 UTC on 15725

UK: Radio Wales Int'l. Travelogue program with good signal. (Weronka, NC) Station 7110, 2150-2159:30. Feature on Celtic and national symbols of Wales. SIO 433. (Frodge, DXpedition)

1518 UTC on 11690

JORDAN: Radio. English text to pop tunes and "96.3 FM" spot to time check. "RJ" identification at 1528. (Frodge, MI) 11690, 1645 with RTTY interference. (Rossetti, MA)

1630 UTC on 21470

ASCENSION ISLANDS: BBC relay. News update on African sports scene. (Rossetti, MA) **FEBA Radio**-Ascension Is. Relay 15125, 1838-1848. (Barbour, NH)

1700 UTC on 15355

GABON: Radio Japan relay. *Current Affairs* program discussion on President Bush, followed by Japanese music. (Rossetti, MA)

1917 UTC on 15120

NIGERIA: Voice of. Vernaculars to continuous Afro pops. No identification or announcements // 9690. Both freqs signal good. (Barbour, NH)

2220 UTC on 6250.4

EQUATORIAL GUINEA: Radio Nacional. Spanish/Vernaculars. Fair signal quality for announcements, IDs and Afro pops music. (Slaen, ARG)

2238 UTC on 5030

BURKINA FASO: Radio Burkina. French text to tribal vocals and drum music. Fair-poor quality during ID. (D'Angelo, PA/DX Window) 5030, 2317-2332+; 5030, 0627-0642+ (Frodge, MI)

2349 UTC on 2390

MEXICO: XEJN-Radio Huayacocotla. Spanish. Musical variety tunes to name/phone numbers announcement segment. **XEOI-Radio Mil** 6010, 0222 with *Musica Mexicana*. (Frodge, MI) **XERTA** 4810, 1126-1151 English/Spanish IDs to religious music. (Barbour, NH; Frodge, MI)

Thanks to our contributors – Have you sent in YOUR logs?

Send to Gayle Van Horn, c/o Monitoring Times (or e-mail gaylevanhorn@monitoringtimes.com) **Please note:** paper strips and cassette recordings will no longer be accepted. English broadcast unless otherwise noted.

Tentative Reports

Have there been times while listening, when you were not positively certain a station was the one you thought it might be? Perhaps the station did not identify itself, but everything else points to this being your sought-after station. The programming style, frequency and language fit correctly, plus other DXers are hearing the station, while your logging remains "tentative."

This could be a perfect opportunity to compose a *Tentative Report* – one that should, however, be used with caution. A *Tentative Report* is used only when there is little hope of obtaining further reception within a reasonable length of time. It could be necessitated by the time and location constraints of a DXpedition or by rare reception of a low-power domestic station, probably in a foreign language. By reporting the programming details, you must make it clear to the station

that, while you are not positively certain, based on monitoring you believe it to be the station in question.

Tentative Reports should not be used if there is a good chance of hearing the station again, where programming may include an identification. If possible, try monitoring the station over several sessions in order to include as many program details, date, frequency, parallel frequencies, language and signal conditions as you can.

Occasionally, you have no choice but to report the log as "tentative," but don't rely exclusively on the station to confirm what "you think" you heard. It is a method that has been used successfully, but don't overuse it. Most listening situations, with enough effort, will result in certainty of the station.

AMATEUR RADIO

Assateague Island, MD (NA-139), 20 meters SSB. Full data card received in 20 days for a SASE to; Stanley J. Iarosis N2US, 3105 Teton Lane, Bowie, MD 20715. (Larry Van Horn, NC)

Czech Rep. OK1BNS, 10 meters SSB. B&W full data card. Received in ten days via ARRL. (Van Horn, NC)

France, F8CTY, 10 meters SSB. Full data fold-out card. Received in ten months via ARRL. (Van Horn, NC)

CLANDESTINE

SW Radio Africa, 4880 kHz (100 kW). Full data email verification for test broadcast, signed by Technical Manager noting, "transmitter location is restricted for security reasons." Email: tech@swradioafrica.com. Website: <http://www.swradioafrica.com>. Station address: SW Radio Ltd., P.O. Box 243, Borehamwood, Herts, WD6 4WA United Kingdom. (Jari Savolainen, Kuusankoski, Finland/HCDX)

Dejan Radio (anti-Ethiopian government, via Russia) 12120 kHz. Full data verification card with illegible signature. Received in 13 months for an English report. Station address: TDP, P.O. Box 1, 2310 Rijikvorsel, Belgium. Website: <http://www.ethiopiancommentator.com/dejenradio/index2.html>. (Arnaldo Slaen, Buenos Aires, Argentina)

CYPRUS

Cyprus Broadcasting Corp., 7205 kHz. Full data color studio card signed by Director General. Received in 68 days for an En-

glish report and mint stamps. Station address: P.O. Box 24824, Nicosia 1397, Cyprus. Website: <http://www.cybc.com>. (Frank Hillton, Charleston, SC)

ECUADOR

ADDX (Assoziation Deutschepacachinger Kurzwellhorer) 17795 kHz. Full data QSL card signed by Hans W. Lange, plus station stickers. Verification for DX program via HCJB. Received in 12 days for an English report. Station address: ADDX e.V., Stichwort: Radio HCJB, Postfach 130 124, 40551 Dusseldorg, Germany. (Slaen, ARG)

FRANCE

Voice of Africa 15660, 17880 kHz. Full data multicolored QSL card with illegible signature, plus a blank reception report form. Received in 47 days for an English report. QSL address: P.O. Box 17, Hamrun, Malta. (Sam Wright, Biloxi, MS) Station address: P.O. Box 4677, Soug al Jama, Tripoli, Libya. VO Africa is the external service of Libyan Jamahiriyah Broadcasting -ed.

HONDURAS

HRMI, 3129 kHz. Full data card with reference to "5010 to be restored later." Received for an English report. Station address: IMF World Missions, P.O. Box 6321, San Bernardino, CA 92412 USA. (Gerry Bishop, Niceville, FL/DXLD)

INDIA

All India Radio-Mumbai 4840 kHz. Full data verification letter signed by Mr. M. Indiran-Superintending Engineer. Received in six days for an English report. Station address: All India Radio, Backbay Reclamation, H.T. Parekha Magr, Mumbai 400020, India. (Jose Jacob VU2JOS, India/WOR, DXLD)

MEDIUM WAVE

New Zealand, 2XP 711 kHz AM (5kW). Full data verification letter signed by Richie Fullard-Network Promotions Manager, plus bumper stickers, and a beautiful long sleeved Radio Pacific shirt. Package cost almost \$18 NZ to air mail, plus they phoned me for an on-air interview. Received in 30 days for an AM report. Station address: Radio Pacific, Private Bag, Ponsonby, Auckland, New Zealand. NZ medium wave # 111. (Patrick Martin, Oceanside, OR) I'll say it again folks, no one QSLs medium wave like Pat! -ed.

KAZA, 1290 kHz AM. Verification letter signed by Veronica Yanez-General Manager. Received in 350 days for an AM report. Station address: 765 Story Road, San Jose, CA 95122. (Martin, OR)

KCAL, 1410 kHz AM. Verification letter signed by Alfredo Gonzalez-Public Relations, plus bumper sticker and business card. Received in 13 days for an AM report. Station address: S. Sunwest Lane # 302, San Bernardino, CA 92408. (Martin, OR)

SPAIN

Radio Exterior Espana, 11625 kHz. Full data Spanish verification letter signed by Mary Cortes and Spanish station form letter, plus station stickers. Received in 16 days for an English report and one IRC. QSL address: Programa Espanoles en la Mar, Postal 1233, Santa Cruz de Tenerife, Spain. (Scott Barbour, Intervale, NH) Website: <http://www.ree.rne.es>. REE has temporarily suspended QSLing due to budget and staffing constraints, and request reports be sent to the above address. - ed.

SURINAME

Radio Apintie, 4990 kHz. Full data email verification letter from Charles Vervuurt-Director. Received in ten hours for an English email report. Letter indicates the station's six element log periodic antenna is beamed to their interior; they are however, very pleased to hear from listeners outside their country. Email: apintie@sr.net. Station address: P.O. Box 595, Verl Gemenelansweg # 37, Paramiribo, Suriname. (Slaen, ARG)

April Holiday DXing

Iran Republic, April 1
Georgia Independence Day (from Soviet Union), April 9
Senegal Independence Day, April 14
American Samoa Flag Day, April 17
Syria Independence Day, April 17
Zimbabwe Independence Day, April 18
Tanzania Union Day, April 26
Sierra Leone Independence Day, April 27
South Africa Freedom Day, April 27
Togo Independence Day, April 27



Random Thoughts

I'm having a hard time focusing again.

♦ Managing Traffic & Magic

On a February installment of *Write On*, the Operations Manager of **BBC World Service** English Networks and News, Mark Flashman (at least that's how his name sounded), explained to a listener why the same program continuity error persisted over the course of a day. The listener wanted to hear *Health Matters*, but an additional broadcast of *Just A Minute* aired in its place – twice! He was frustrated that no one at the **BBC** caught the problem and wanted to know why.

Curiously, Mr. Flashman cited human error as the culprit. *Just A Minute* was inadvertently loaded into the time slot for *Health Matters* as well as into its own timeslot on the computer playout system that now serves as the network's traffic manager. To compound matters, the two programs are actually scheduled to run consecutively. So, the same edition of *Just A Minute* succeeded itself twice over a period of twelve hours.

In years past when the **BBC** experienced any anomaly, there was always an announcer at the ready to set things right and apologize to the listener for the inconvenience. But Mr. Flashman explained that the **World Service** now has eight regional streams in place to ensure that listeners all over the world receive their programs at convenient local listening times. It's just not possible, he said, to have a "live body" on hand to monitor all of this content, so the computers are relied upon to maintain order. When there's a glitch, it can take some time to catch up with it. He apologized, of course – perhaps reasoning "better late than never."

It was nice to finally hear a forthright explanation for this state of affairs. It's simply an ordering of priorities. The former courtesies and the practice of having someone minding the store have been deemed expendable in the effort to (how to put it?) serve listeners better – with more convenient timings and, as well it seems, better shortwave signals.

In this latter regard, the use of relays and shared transmission facilities have grown markedly. Coordinately, the use of interval signals and continuity announcements (such as retuning instructions or simple hellos and good-byes when transmitters come on and go off) have been sharply curtailed. Arguably, such tools are less required in the digital tuning age; but efficiency is at work in this instance, as well. Scheduling is tight and air time is expensive. Better to have all available time devoted to matters of

substance and necessity. In truth, this is as valid and persuasive an argument as that offered by the **BBC**.

But it is *so* impersonal and radio is, at its core, an *intensely* personal medium. The loss of human traffic managers, continuity announcers, tuning instructions, interval signals and – yes – the simple act of saying good-bye before the transmitter goes dark has allowed an unwelcome, mechanistic quality to creep into our radio. We may suspect that the computers are there, but to be continually confronted with that reality spoils the experience.

A big part of radio's magic is the illusion that it's just you and the announcer. Undervaluing that illusion – even for all the good reasons stated – just may be costing radio far more than what its current managers think they are gaining.

♦ The Platform Migration Era

It's hard not to feel a sharp pain when any international broadcaster decides to reduce or end its use of shortwave. And so it was when **RTE Ireland** summarily decided – after a perfunctory, last minute and (let's be honest) totally inconsequential survey of its listeners – to discontinue with shortwave entirely at the end of 2003.

But, by now, it should come as no surprise that broadcasters are actively reevaluating their distribution strategies. As we've said numerous times in this space, times have changed markedly – the loss of international radio's "automatic" rationale when the Cold War ended, the creation of new delivery platforms, new resource pressures, the increased intrusion of commercial principles into (and active skepticism toward) public service values.

On shortwave, we've witnessed the de-emphasis of tropical band radio in developing regions and the loss of several international broadcasting stations and services entirely (or, at least, many language and geographically targeted services – especially those toward North America and Australasia.) Many broadcasters are hedging their bets; some are changing the mix or putting their eggs in one or two baskets and throwing other baskets away (**RTE** and **Swiss Radio International**, to illustrate); others (**Radio Norway/NRK**, **Radio Denmark/DR** are recent examples) are deciding to drop out of the game altogether.

But in many cases, overall services are not being reduced and actually may be expanding. **RTE** is no longer on shortwave, but it has increased its presence on satellite radio – such as via **WRN** to North America – to two hours per

day. **Radio Polonia** has never broadcast to North America via shortwave; but it does now via **WRN**. In a similar vein, **CBC** domestic radio has largely migrated from MW to FM, so very few U.S. listeners can now "eavesdrop" (as they once did) on **CBC** programs with their AM radios. But all major **CBC** regional outlets now stream and archive their audio on the Internet which means that U.S. (and, indeed, worldwide) listeners (with a computer) have greatly increased access to **CBC** programs.

We are seeing many shifts like this and are likely to see more. One suspects that none of these decisions is permanent. Interestingly, though, there are still newcomers to international radio. China's **Radio Guangdong** and Copenhagen's **Banns Radio International** are two. They are a testament to the new era of multiple platforms in that they have chosen means other than shortwave (satellite and **WRN** in these cases) to make their debut. That doesn't mean that shortwave can't be part of their mix sometime in the future.

There's truly *only* one distressing aspect in all this "churn." It is that some decisions are made on less than objective or convincing evidence, often with unrealistic expectations, and without genuine opportunity or regard for meaningful listener input. Could it be that, in certain situations, concerns over survival have led some station managements to immediately cater to the uninformed biases of their paymasters rather than insist on serving the best interests of their listeners?

It's just a thought.

Until May, good listening – wherever you find it!

Software for the Shortwave Listener...

Radio Listener's Database.....	NOW FREE
SWBC Schedules - Broadcast frequencies and programs, updated monthly+.....	NOW FREE
Smart R8 Control - for the Drake R8/R8A/R8B.....	\$60
Smart Icom Control - for IC-R75.....	\$60
Smart NRD Control - for NRD-535/545.....	\$60
Smart Kenwood Control - for R-5000.....	\$60
Smart Audio Control - Scope, spectrum analyzer.....	\$35

FineWare

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fineware@fineware-sw1.com * www.fineware-sw1.com



HOW TO USE THE SHORTWAVE GUIDE

0000-0100 twhfa USA, Voice of America 5995am 6130ca 7405am 9455af
 ① ② ⑤ ③ ④ ⑥ ⑦

Convert your time to UTC.

Broadcast time on ① and time off ② are expressed in Coordinated Universal Time (UTC) – the time at the 0 meridian near Greenwich, England. To translate your local time into UTC, first convert your local time to 24-hour format, then add (during Daylight Time) 4, 5, 6 or 7 hours for Eastern, Central, Mountain or Pacific Times, respectively. Eastern, Central, and Pacific Times are already converted to UTC for you at the top of each hour.

Note that all dates, as well as times, are in UTC; for example, a show which might air at 0030 UTC Sunday will be heard on Saturday evening in America (in other words, 8:30 pm Eastern, 7:30 pm Central, etc.).

Find the station you want to hear.

Look at the page which corresponds to the time you will be listening. On the top half of the page English broadcasts are listed by UTC time on ①, then alphabetically by country ③, followed by the station name ④. (If the station name is the same as the country, we don't repeat it, e.g., "Vanuatu, Radio" [Vanuatu].)

If a broadcast is not daily, the days of broadcast ⑤ will appear in the column following the time of broadcast, using the following codes:

Day Codes

s/S	Sunday
m/M	Monday
t/T	Tuesday
w/W	Wednesday
h/H	Thursday
f/F	Friday
a/A	Saturday
D	Daily
mon/MON	monthly
occ:	occasional
DRM:	Digital Radio Mondiale

In the same column ⑤, irregular broadcasts are indicated "tent" and programming which includes languages besides English are coded "vl" (various languages).

Choose the most promising frequencies for the time, location and conditions.

The frequencies ⑥ follow to the right of the station listing; all frequencies are listed in kilohertz (kHz). Not all listed stations will be heard from your location and virtually none of them will be heard all the time on all frequencies.

Shortwave broadcast stations change some of their frequencies at least twice a year, in April and October, to adapt to seasonal conditions.

But they can also change in response to short-term conditions, interference, equipment problems, etc. Our frequency manager coordinates published station schedules with confirmations and reports from her monitoring team and MT readers to make the Shortwave Guide up-to-date as of one week before print deadline.

To help you find the most promising signal for your location, immediately following each frequency we've included information on the target area ⑦ of the broadcast. Signals beamed toward your area will generally be easier to hear than those beamed elsewhere, even though the latter will often still be audible.

Target Areas

af:	Africa
al:	alternate frequency (occasional use only)
am:	The Americas
as:	Asia
au:	Australia
ca:	Central America
do:	domestic broadcast
eu:	Europe
irr:	irregular (Costa Rica RFPI)
me:	Middle East
na:	North America
om:	omnidirectional
pa:	Pacific
sa:	South America
va:	various

Choose a program or station you want to hear.

Selected programs for prime listening hours appear following the frequencies – space does not permit 24 hour listings nor can every station be listed. However, listings for the most popular stations and selected lesser-known stations illustrate the variety available on shortwave. The format of the listings alternates among three different styles – by station, by genre and by day – month by month. Times listed are approximate and programs are subject to change.

The program listings emphasize broadcasts targeted to North America. In most cases, the stations and programs listed should be readily receivable in North America using a portable radio. Most broadcasters produce one broadcast in English per day that is repeated over a 24 hour period to all areas. If you are able to listen to transmissions to other areas of the world during "non-prime time" hours, referring to the prime time listings for those stations will likely be helpful in determining what programs will be broadcast.

Occasionally, a program or station listing may be followed by a reference to another listing for the same program or station at a different time. This is done to conserve space and make it possible to provide more listings.

MT MONITORING TEAM

Gayle Van Horn John Figliozi
 Frequency Manager Program Manager
 gaylevanhorn@monitoringtimes.com johnfigliozi@monitoringtimes.com

Mark Fine, VA
 markfine@monitoringtimes.com

Program Highlights

John Figliozi

The Death of the VOA?

There are reports that the **Voice of America** in English, already reduced to 19 hours a day, will soon be further cut to 14 hours a day. Other languages are also being cut. This is an incredible development given the international situation today. It is even more incredible given the reputation that the VOA holds internationally for integrity and reliability.

Thanks to the **Smith-Mundt Act** (see *November's MT*), this is all taking place out of public view. The primary culprits appear to be the **Broadcasting Board of Governors**, an assemblage of commercial broadcasting denizens and political patronage appointees who apparently favor lavishing resources on obscure commercial-sounding propaganda outlets at the expense of this nation's longtime most identifiable and trusted international public broadcaster. (Could this be because the VOA has a **Charter** ensuring integrity and protecting it from governmental interference, which these new entities lack?)

What can you do? Write to your respective lawmakers (House and Senate) asking these questions and making these points:

1. Why reduce trusted and relied-upon **VOA** English and foreign language programming at a time when this country faces such unprecedented challenges abroad?
2. Why does the Smith-Mundt Act remain U.S. law, effectively preventing U.S. citizens from hearing and seeing first hand what its government is saying and showing to those abroad?
3. Demand that this nation's primary international broadcaster, the **VOA** not be broken up or continue to suffer a "death of a thousand cuts" at the hands of those intent on breaking up in favor of propagandistic region-specific entities (**Radio Free Asia**, **Radio Farda**, **Radio Sawa**, etc) which will never achieve the status or reputation of the **VOA** and do not exemplify the cherished principles of our nation.
4. Emphasize the importance of maintaining and safeguarding **VOA's** independent journalistic functions – free of interference from the U.S. government (whether Republican or Democrat).

If I can help you do this, e-mail me. It's important.



0000 UTC - 8PM EDT / 7PM CDT / 5PM PDT (Daylight Savings Time)

0000	0007		Sierra Leone, SLBS	3316do		
0000	0015	vl	Cambodia, National Radio Of	11940as		
0000	0015		Japan, Radio	13650as	17810as	
0000	0030		Egypt, Radio Cairo	11725na		
0000	0030		Thailand, Radio	9680af		
0000	0030		UK, BBC World Service	3915as	11945as	
			17615as			
0000	0030		USA, Voice of America	7215va	9890va	
			11760va	15185va	17740va	
			17820va			
0000	0045		India, All India Radio	9705as	9950as	
			11620as	11645as	13605as	
0000	0055		Netherlands, Radio	9845na		
0000	0057		Canada, Radio Canada Intl	5960na	9590na	
			9755as	11895as		
0000	0059	DRM	UK, BBC World Service	6015na		
0000	0100		Anguilla, Caribbean Beacon	6090am		
0000	0100		Australia, ABC NT Alice Springs	2310irr	4835do	
0000	0100		Australia, ABC NT Katherine	5025do		
0000	0100		Australia, ABC NT Tennant Creek	4910do		
0000	0100		Australia, Radio	9660pa	12080va	13630pa
			15240pa	15415as	17750as	17775va
			17795va	21725as		
0000	0100		Bulgaria, Radio	7400na	9400na	
0000	0100		Canada, CBC Northern Service	9625do		
0000	0100		Canada, CFRX Toronto ON	6070do		
0000	0100		Canada, CFVP Calgary AB	6030do		
0000	0100		Canada, CKZN St John's NF	6160do		
0000	0100		Canada, CKZU Vancouver BC	6160do		
0000	0100		Costa Rica, University Network	5030am	6150am	
			7375am	9725sa	11870am	13750na
0000	0100	1st a	Finland, Scandinavian Weekend	Radio	5990eu	
			11690eu			
0000	0100		Germany, Deutsche Welle	7290as	9880as	
0000	0100		Guyana, Voice of	3291do	5950do	
0000	0100		Japan, Radio	6145na		
0000	0100		Malaysia, RTM Radio 4	7295do		
0000	0100		Namibia, Namibian BC Corp	3270af	3290af	
			6060af			
0000	0100		New Zealand, Radio NZ Intl	17675pa		
0000	0100		Sierra Leone, Radio UNAMSIL	6139af		
0000	0100		Singapore, Mediacorp Radio	6150do		
0000	0100	vl	Solomon Islands, SIBC	5020do	9545do	
0000	0100		Spain, Radio Exterior Espana	6055am		
0000	0100		UK, BBC World Service	5970as	5975ca	
			6195as	9410as	9740as	11955as
			12095as	15280as	15310as	15360as
			17790as			
0000	0100		USA, Armed Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7507usb	10320usb
			12133usb	12579usb	13362usb	13855usb
0000	0100		USA, KAIJ Dallas TX	13815va		
0000	0100		USA, KTNB Salt Lake City UT	7505na		
0000	0100		USA, KWHR Naalehu HI	17510as		
0000	0100	twhfa	USA, Voice of America	5995am	6130am	
			7405am	9455am	11695am	
			13790am			
0000	0100		USA, WBCQ Kennebunk ME	7415na	9330na	
0000	0100	mtwhfa	USA, WBCQ Kennebunk ME	5105na		
0000	0100		USA, WBOH Newport NC	5920am		
0000	0100		USA, WEWN Birmingham AL	5825va		
0000	0100		USA, WHRA Greenbush ME	7580va		
0000	0100		USA, WHRI Noblesville IN	5745va	7315am	
0000	0100		USA, WINB Red Lion PA	9320am		
0000	0100		USA, WJIE Louisville KY	7490am	11515va	
			13595am			
0000	0100	sm	USA, WRMI Miami FL	9955am		
0000	0100	twhfa	USA, WRMI Miami FL	7385na		
0000	0100		USA, WTJC Newport NC	9370na		
0000	0100	sm	USA, WWBS Macon GA	11900na		
0000	0100		USA, WWCN Nashville TN	3210na	5070na	
			5935na	7465na		
0000	0100		USA, WWRB Manchester TN	5050na	5085na	
			6890na			
0000	0100		USA, WYFR Okeechobee FL	6085na	9505na	
			11720sa			
0000	0100	vl	Vanuatu, Radio	3945al	7260do	
0000	0100		Zambia, Christian Voice	4965do		
0015	0030	twhfa	Austria, Radio Austria Intl	13730sa		
0030	0100	mtwhf	Germany, Bible Voice Broadcasting		7105as	
0030	0100		Lithuania, Radio Vilnius	6120al	7325na	
0030	0100		Sri Lanka, SLBC	6005as	9770as	15745as
0030	0100		Thailand, Radio	13695na		
0030	0100		UK, BBC World Service	9580as		
0045	0100	twhfa	Austria, Radio Austria Intl	13730sa		
0055	0100		Italy, RAI Intl	9675na	11800na	

0100 UTC - 9PM EDT / 8PM CDT / 6PM PDT

0100	0115		Italy, RAI Intl	9675na	11800na	
0100	0127		Czech Rep, Radio Prague Intl	6200na	7345na	
0100	0127		Slovakia, Radio Slovakia Intl	5930na	7230ca	
			9440sa			
0100	0127		Vietnam, Voice of	6175na		
0100	0130	s	Germany, Universal Life	9435as		
0100	0130	mtwhfa	Serbia & Montenegro, Intl Radio	7115na		
0100	0130	twhfa	USA, Voice of America	5995am	6130am	
			7405am	9455am	9775am	13790am
0100	0130		Uzbekistan, Radio Tashkent Intl	5975as	6165as	
			7160as			
0100	0155		Netherlands, Radio	6165na		
0100	0156		China, China Radio Intl	6140va	9580na	
			9790na			
0100	0156		North Korea, Voice of	3560as	6195as	
			7140am	9345as	11735am	
0100	0156		Romania, Radio Romania Intl	6040na	9510na	
			9530na	11740na		
0100	0159	DRM	China, China Radio Intl	6140na		
0100	0200		Anguilla, Caribbean Beacon	6090am		
0100	0200		Australia, ABC NT Katherine	5025do		
0100	0200		Australia, ABC NT Tennant Creek	4910do		
0100	0200		Australia, HCJB	15560pa		
0100	0200		Australia, Radio	9660pa	12080va	13630pa
			15240pa	15415as	17750as	17775va
			17795va	21725as		
0100	0200		Canada, CBC Northern Service	9625do		
0100	0200		Canada, CFRX Toronto ON	6070do		
0100	0200		Canada, CFVP Calgary AB	6030do		
0100	0200		Canada, CKZN St John's NF	6160do		
0100	0200		Canada, CKZU Vancouver BC	6160do		
0100	0200		Costa Rica, University Network	5030am	6150am	
			7375am	9725sa	11870am	13750na
0100	0200		Cuba, Radio Havana	6000na	9820na	
0100	0200	1st a	Finland, Scandinavian Weekend	Radio	5990eu	
			11690eu			
0100	0200		Guyana, Voice of	3291do	5950do	
0100	0200		Iran, Voice of the Islamic Rep	6120na	9580na	
0100	0200		Japan, Radio	11860as	15325as	
			17560va	17685pa	17810as	17835as
			17845as			
0100	0200		Malaysia, RTM Radio 4	7295do		
0100	0200		Namibia, Namibian BC Corp	3270af	3290af	
			6060af			
0100	0200		New Zealand, Radio NZ Intl	17675pa		
0100	0200		Sierra Leone, Radio UNAMSIL	6139af		
0100	0200		Singapore, Mediacorp Radio	6150do		
0100	0200	vl	Solomon Islands, SIBC	5020do	9545do	
0100	0200		Sri Lanka, SLBC	6005as	9770as	15745as
0100	0200		UK, BBC World Service	5975ca	6195as	
			9410as	9525ca	9825sa	11955as
			15280as	15310as	15360as	17790as
0100	0200		Ukraine, Radio Ukraine Intl	5910na		
0100	0200		USA, Armed Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7507usb	10320usb
			12133usb	12579usb	13362usb	13855usb
0100	0200		USA, KAIJ Dallas TX	13815va		
0100	0200		USA, KTNB Salt Lake City UT	7505na		
0100	0200		USA, KWHR Naalehu HI	17510as		
0100	0200		USA, Voice of America	7200va	7255va	
			9850va	11705va	11820va	15250va
			15290va	17740va	17820va	
0100	0200		USA, WBCQ Kennebunk ME	5105na	7415na	
			9330na			
0100	0200		USA, WBOH Newport NC	5920am		
0100	0200		USA, WEWN Birmingham AL	5825va		
0100	0200		USA, WHRA Greenbush ME	7580va		
0100	0200		USA, WHRI Noblesville IN	5745va	7315am	
0100	0200		USA, WINB Red Lion PA	9320am		
0100	0200		USA, WJIE Louisville KY	7490am	11515va	
			13595am			
0100	0200	sm	USA, WRMI Miami FL	9955am		
0100	0200	twhfa	USA, WRMI Miami FL	7385na		
0100	0200		USA, WTJC Newport NC	9370na		
0100	0200	sm	USA, WWBS Macon GA	11900na		
0100	0200		USA, WWCN Nashville TN	3210na	5070na	
			5935na	7465na		
0100	0200		USA, WWRB Manchester TN	5050na	5085na	
			6890na			
0100	0200		USA, WYFR Okeechobee FL	6065na	9505na	
			15060as			
0100	0200	vl	Vanuatu, Radio	3945al	7260do	
0100	0200		Zambia, Christian Voice	4965do		
0105	0115	sm	Austria, Radio Austria Intl	7325am	9870am	
0115	0120	mtwhf	Kyrgyzstan, Radio Kyrgyz	4010irr	4795irr	
0115	0130		Austria, Radio Austria Intl	7325am	9870am	
0130	0200		Sweden, Radio	9435va		
0130	0200	twhfa	USA, Voice of America	5995am	6130am	
			9455va	13740am		
0135	0145	sm	Austria, Radio Austria Intl	7325am	9870am	
0140	0200		Vatican City, Vatican Radio	7335as	9865as	
0145	0200		Austria, Radio Austria Intl	7325am	9870am	

SELECTED PROGRAMMING BEGINS ON PAGE 55

Shortwave Guide



0200 UTC - 10PM EDT / 9PM CDT / 7PM PDT

0200	0227	Czech Rep, Radio Prague Intl	6200na	7345na
0200	0228	Hungary, Radio Budapest	9835na	
0200	0230	Austria, AWR Europe	7230as	
0200	0230	Iran, Voice of the Islamic Rep	6120na	9580na
0200	0230	Serbia & Montenegro, Intl Radio	7130na	
0200	0230	USA, KJES Vado NM	7555na	
0200	0256	North Korea, Voice of	4405as	9325as
		11335as		
0200	0256	South Korea, Radio Korea Intl	9560na	11810sa
		15575na		
0200	0259	Canada, Radio Canada Intl	6040am	9755am
		11725am	15150as	17860am
0200	0300	Anguilla, Caribbean Beacon	6090am	
0200	0300	Argentina, RAE	11710am	
0200	0300	Australia, ABC NT Alice Springs	2310irr	4835do
0200	0300	Australia, ABC NT Katherine	5025do	
0200	0300	Australia, ABC NT Tennant Creek	4910do	
0200	0300	Australia, HCB	15560pa	
0200	0300	Australia, Radio	9660pa	12080va
		15240pa	15415as	15515va
		21725as		
0200	0300	Canada, CBC Northern Service	9625do	
0200	0300	Canada, CFRX Toronto ON	6070do	
0200	0300	Canada, CFVP Calgary AB	6030do	
0200	0300	Canada, CKZN St John's NF	6160do	
0200	0300	Canada, CKZU Vancouver BC	6160do	
0200	0300	Costa Rica, University Network	5030am	6150am
		7375am	9725sa	11870am
0200	0300	Cuba, Radio Havana	6000na	9820na
0200	0300	Egypt, Radio Cairo	11780na	
0200	0300	Finland, Scandinavian Weekend Radio		5980eu
		11720eu		
0200	0300	Germany, Bible Voice Broadcasting		17540as
0200	0300	Guyana, Voice of	3291do	
0200	0300	Indonesia, Voice of	9525as	11785as
0200	0300	Malaysia, RTM Radio 4		7295do
0200	0300	Myanmar, Radio	7185do	
0200	0300	Namibia, Namibian BC Corp	3270af	3290af
		6090af		
0200	0300	New Zealand, Radio NZ Intl	17675pa	
0200	0300	Philippines, Radio Pilipinas	12015me	15120me
		15270me		
0200	0300	Russia, Voice of	5995me	6155na
		9765na	15445na	15595na
0200	0300	Sierra Leone, Radio UNAMSIL	6139af	
0200	0300	Singapore, Mediacorp Radio	6150do	
0200	0300	Solomon Islands, SIBC	5020do	9545do
0200	0300	Sri Lanka, SIBC	6005as	9770as
0200	0300	Taiwan, Radio Taiwan Intl	5950na	9680na
		11875as	15320as	
0200	0300	UK, BBC World Service	5975ca	6195eu
		9410me	9525ca	9750af
		11955as	12095sa	15280as
		15360as	17790as	
0200	0300	USA, Armed Forces Radio	4319usb	5446usb
		5765usb	6350usb	7507usb
		12133usb	12579usb	13362usb
0200	0300	USA, KAIJ Dallas TX	5755va	
0200	0300	USA, KTN Salt Lake City UT	7505na	
0200	0300	USA, KWHR Naalehu HI	17510as	
0200	0300	USA, Voice of America	7200va	7255va
		9850va	11705va	11820va
		15250va	15290va	17740va
0200	0300	USA, WBCQ Kennebunk ME	5105na	17820va
0200	0300	USA, WBOH Newport NC	5920am	
0200	0300	USA, WEWN Birmingham AL	5825va	
0200	0300	USA, WHRA Greenbush ME	7580va	
0200	0300	USA, WHRI Noblesville IN	5745va	7315am
0200	0300	USA, WINB Red Lion PA	9320am	
0200	0300	USA, WJIE Louisville KY	7490am	11515va
		13595am		
0200	0300	USA, WRMI Miami FL	7385na	
0200	0300	USA, WTJC Newport NC	9370na	
0200	0300	USA, WWCN Nashville TN	3210na	5070na
		5935na	7465na	
0200	0300	USA, WWRB Manchester TN	5050na	5085na
		6890na		
0200	0300	USA, WYFR Okeechobee FL	5985na	6065na
		9505na	9985sa	11855ca
0200	0300	Vanuatu, Radio	3945al	7260do
0200	0300	Zambia, Christian Voice	4965do	
0215	0220	Nepal, Radio	3230as	5005as
		7164as		6100as
0230	0257	Vietnam, Voice of	6175na	
0230	0300	Sweden, Radio	9495na	
0245	0300	Albania, Radio Tirana Intl		7160na
0245	0300	UK, BBC World Service	9610af	
0250	0300	Vatican City, Vatican Radio	7305am	9605am
0250	0300	Zambia, Radio	4910do	

0300 UTC - 11PM EDT / 10PM CDT / 8PM PDT

0300	0310	Vatican City, Vatican Radio	7305am	9605am
		9660af 17665as		
0300	0315	Croatia, Voice of	7285na	
0300	0330	Australia, HCB	15560pa	
0300	0330	sm w fa	5970eu	7210eu
0300	0330	Belarus, Radio Belarus Intl		
0300	0330	Egypt, Radio Cairo	11780na	
0300	0330	as	12015me	15120me
		15270me		
0300	0330	Thailand, Radio	15460na	
0300	0330	a	UK, Wales Radio Intl	9735na
0300	0330		USA, KJES Vado NM	7555na
0300	0355	South Africa, Channel Africa	3345af	9770af
0300	0356	China, China Radio Intl	9690na	9790na
0300	0356	North Korea, Voice of	3560as	6195as
		7140as 9345as		
0300	0356	Romania, Radio Romania Intl	6040na	9515na
0300	0400	Anguilla, Caribbean Beacon	6090am	
0300	0400	Australia, ABC NT Alice Springs	2310irr	4835do
0300	0400	Australia, ABC NT Katherine	5025do	
0300	0400	Australia, ABC NT Tennant Creek	4910do	
0300	0400	Australia, Radio	9660pa	12080va
0300	0400		15240pa	15415as
		21725as	15515va	17750as
0300	0400	Botswana, Radio	4820do	4830al
0300	0400	Bulgaria, Radio	7400na	7255do
0300	0400	Canada, CBC Northern Service	9625do	
0300	0400	Canada, CFRX Toronto ON	6070do	
0300	0400	Canada, CFVP Calgary AB	6030do	
0300	0400	Canada, CKZN St John's NF	6160do	
0300	0400	Canada, CKZU Vancouver BC	6160do	
0300	0400	Costa Rica, University Network	5030am	6150am
		7375am	9725sa	11870am
		17645as		
0300	0400	Cuba, Radio Havana	6000na	9820na
0300	0400	1st a	Finland, Scandinavian Weekend Radio	5980eu
		11720eu		
0300	0400	Guyana, Voice of	3291do	5950do
0300	0400	Japan, Radio	21610pa	
0300	0400	Malaysia, RTM Radio 4		7295do
0300	0400	Namibia, Namibian BC Corp	3270af	3290af
		6090af		
0300	0400	New Zealand, Radio NZ Intl	17675pa	
0300	0400	Oman, Radio	15355af	
0300	0400	Russia, Voice of	6155na	7180na
		15445na	15595na	7350na
0300	0400	Sierra Leone, Radio UNAMSIL	6139af	
0300	0400	Singapore, Mediacorp Radio	6150do	
0300	0400	Solomon Islands, SIBC	5020do	9545do
0300	0400	Sri Lanka, SIBC	6005as	9770as
0300	0400	Sudan, Sudan Radio Service	9625af	15745as
0300	0400	Taiwan, Radio Taiwan Intl	5950na	9680na
		11875as	15125sa	
0300	0400	Uganda, Radio	4976do	5026do
0300	0400	UK, BBC World Service	3255af	5975ca
		6005af 6190af	6195eu	7160af
		9525am	9750af	9410me
		12035af	15280as	11765af
		15410af	15575me	15310as
		21660as		17760as
0300	0400	USA, Armed Forces Radio	4319usb	5446usb
		5765usb	6350usb	7507usb
		12133usb	12579usb	13362usb
0300	0400	USA, KAIJ Dallas TX	5755va	
0300	0400	USA, KTN Salt Lake City UT	7505na	
0300	0400	USA, KWHR Naalehu HI	17510as	
0300	0400	USA, Voice of America	4960af	6035af
		6080af 7265af	7290af	7415af
		9575af 9885af		
0300	0400	USA, WBCQ Kennebunk ME	7415na	9330na
0300	0400	USA, WBOH Newport NC	5105na	
0300	0400	USA, WEWN Birmingham AL	5920am	
0300	0400	USA, WHRA Greenbush ME	5825va	
0300	0400	USA, WHRI Noblesville IN	7580va	
0300	0400	USA, WINB Red Lion PA	5745va	7315am
0300	0400	USA, WJIE Louisville KY	9320am	
		13595am	7490am	11515va
0300	0400	USA, WRMI Miami FL	7385na	
0300	0400	USA, WTJC Newport NC	9370na	
0300	0400	USA, WWCN Nashville TN	3210na	5070na
		5935na	7465na	
0300	0400	USA, WWRB Manchester TN	5050na	5085na
		6890na		
0300	0400	USA, WYFR Okeechobee FL	6065na	9505na
		11740as		
0300	0400	Vanuatu, Radio	3945al	7260do
0300	0400	Zambia, Radio	4910do	
0300	0400	Zambia, Radio Christian Voice	6065do	
0300	0400	Zimbabwe, ZBC Corp	5975do	
0310	0330	Vatican City, Vatican Radio	9660af	17665as
0330	0357	Vietnam, Voice of	6175na	
0330	0358	Hungary, Radio Budapest	9835na	
0330	0400	Albania, Radio Tirana Intl	6165eu	7160eu
0330	0400	Malaysia, Radio Malaysia Kota		5979do
0330	0400	Sweden, Radio	9495na	

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0330	0400	UAE, Radio Dubai	12005na	13675na	15400na
		17890na			
0330	0400	UK, BBC World Service		7130eu	7265eu
		9670eu			
0345	0400	Tajikistan, Radio	7245irr		

0400 UTC - 12AM EDT / 11PM CDT / 9PM PDT

0400	0427	Czech Rep, Radio Prague Intl	6200na	7345na	
0400	0430	France, Radio France Intl	9805af	11995af	
0400	0430	South Africa, Channel Africa	3345af		
0400	0430	Sri Lanka, SLBC	6005as	15745as	
0400	0450	Turkey, Voice of	6020va	7240eu	
0400	0455	Netherlands, Radio	6165na	9590na	
0400	0456	China, China Radio Intl	6190na	9560na	
		9755na			
0400	0500	Anguilla, Caribbean Beacon	6090am		
0400	0500	Australia, ABC NT Alice Springs	2310irr	4835do	
0400	0500	Australia, ABC NT Katherine	5025do		
0400	0500	Australia, ABC NT Tennant Creek	4910do		
0400	0500	Australia, Radio	9660pa	12080va	13630pa
		15240pa	15415as	15515va	17750as
		21725as			
0400	0500	Botswana, Radio	4820do	4830al	7255do
0400	0500	Canada, CBC Northern Service	9625do		
0400	0500	Canada, CFRX Toronto ON	6070do		
0400	0500	Canada, CKZN St John's NF	6160do		
0400	0500	Canada, CKZU Vancouver BC	6160do		
0400	0500	Costa Rica, University Network	5030am	6150am	
		7375am	9725sa	11870am	13750na
		17645as			
0400	0500	Cuba, Radio Havana	6000na	9820na	
0400	0500	Finland, Scandinavian Weekend Radio	11720eu	5980eu	
0400	0500	Germany, Deutsche Welle	6180af	9545af	
		9710af			
0400	0500	Germany, Overcomer Ministries	9770au		
0400	0500	Guyana, Voice of	3291do	5950do	
0400	0500	Malaysia, Radio Malaysia Kota		Kinabalu	5979do
0400	0500	Malaysia, RTM Radio 4		7295do	
0400	0500	Namibia, Namibian BC Corp	3270af	3290af	
		6090af			
0400	0500	New Zealand, Radio NZ Intl	15340pa		
0400	0500	Russia, Voice of	7125na	7180na	7240na
		7350na	12010na	15445na	15595na
0400	0500	Sierra Leone, Radio UNAMSIL	6139af		
0400	0500	Singapore, MediCorp Radio	6150do		
0400	0500	Solomon Islands, SIBC	5020do	9545do	
0400	0500	Sudan, Sudan Radio Service	9625af		
0400	0500	Uganda, Radio	4976do	5026do	7196do
0400	0500	UK, BBC World Service	3255af	5975am	
		6005af 6135ca	6190af	7160af	12035af
		9410eu	11760me	11765af	12035af
		15280as	15310as	15360as	15420af
		15575me	17760as	17790as	21660as
0400	0500	UK, BBC World Service	6010na		
0400	0500	Ukraine, Radio Ukraine Intl	5910na		
0400	0500	USA, Armed Forces Radio	4319usb	5446usb	
		5765usb	6350usb	7507usb	10320usb
		12133usb	12579usb	13362usb	13855usb
0400	0500	USA, KALJ Dallas TX	5755va		
0400	0500	USA, KLTN Salt Lake City UT		7505na	
0400	0500	USA, KWHR Naalehu HI		17780as	
0400	0500	USA, Voice of America	4960af	6080af	
		7170va	7290af	7415af	9475af
		9575af 9885af	15205va		
0400	0500	USA, WBCQ Kennebunk ME	5105na	7415na	
0400	0500	USA, WBCQ Kennebunk ME	9330na		
0400	0500	USA, WBOH Newport NC	5920am		
0400	0500	USA, WEWN Birmingham AL	5825na		
0400	0500	USA, WHRA Greenbush ME	7580va		
0400	0500	USA, WHRI Noblesville IN	5745va	7315am	
0400	0500	USA, WINB Red Lion PA	9320am		
0400	0500	USA, WJIE Louisville KY	7490am	11515va	
		13595am			
0400	0500	USA, WMLK Bethel PA	9465eu		
0400	0500	USA, WRMI Miami FL	7385na		
0400	0500	USA, WTJC Newport NC	9370na		
0400	0500	USA, WWCR Nashville TN	3210na	5070na	
		5770na	5935na		
0400	0500	USA, WWRB Manchester TN	5050na	5085na	
		6890na			
0400	0500	USA, WYFR Okeechobee FL	6065na	6855va	
		7355va	9505na		
0400	0500	Vanuatu, Radio	3945al	7260do	
0400	0500	Zambia, Radio	4910do		
0400	0500	Zambia, Radio Christian Voice	6065do		
0400	0500	Zimbabwe, ZBC Corp	5975do		
0415	0420	Kyrgystan, Radio Kyrgyz	4010irr	4795irr	
0430	0457	Czech Rep, Radio Prague Intl	9865va	11600va	
0430	0500	Nigeria, Radio/Enugu	6025do		
0430	0500	Nigeria, Radio/Ibadan	6050do		
0430	0500	Nigeria, Radio/Kaduna	4770do	6090do	
0430	0500	Nigeria, Radio/Lagos	3326do	4990do	
0430	0500	Swaziland, TWR	4775af	6120af	
0445	0500	Italy, RAI Intl	5965af	6100af	7230af

0500 UTC - 1AM EDT / 12AM CDT / 10PM PDT

0500	0515	Israel, Kol Israel	6280va	7545va	17600va
0500	0529	Belgium, Radio Vlaanderen Intl		9590na	
0500	0530	France, Radio France Intl		11850af	13610af
0500	0530	UK, BBC World Service		15280as	17885af
0500	0530	as	UK, BBC World Service	7295eu	9670eu
		11845eu			
0500	0530	Vatican City, Vatican Radio		7360af	9660af
		11625af			
0500	0556	China, China Radio Intl		6190na	9560na
0500	0600	Anguilla, Caribbean Beacon		6090am	
0500	0600	Australia, ABC NT Alice Springs		2310irr	4835do
0500	0600	Australia, ABC NT Katherine		5025do	
0500	0600	Australia, ABC NT Tennant Creek		4910do	
0500	0600	Australia, Radio	9660pa	12080va	13630pa
		15160as	15240pa	15515va	17750as
0500	0600	Botswana, Radio	4820do	4830al	7255do
0500	0600	Canada, CBC Northern Service		9625do	
0500	0600	Canada, CFRX Toronto ON		6070do	
0500	0600	Canada, CKZN St John's NF		6160do	
0500	0600	Canada, CKZU Vancouver BC		6160do	
0500	0600	Costa Rica, University Network		5030am	6150am
		7375am	9725sa	11870am	13750na
		17645as			
0500	0600	Cuba, Radio Havana		9550am	9820na
		11760na			
0500	0600	1st a	Finland, Scandinavian Weekend Radio		6170eu
		11690eu			
0500	0600	Germany, Deutsche Welle		9565af	11805af
		12045af			
0500	0600	vi	Greece, Voice of	9420eu	12105eu
0500	0600		Guyana, Voice of	3291do	5950do
0500	0600		Japan, Radio	5975eu	6110na
			11715eu	11760as	15195as
			21755pa		17810as
0500	0600		Kuwait, Radio	15110as	
0500	0600		Malaysia, Radio Malaysia Kota		Kinabalu
0500	0600		Malaysia, RTM Radio 4		7295do
0500	0600		Namibia, Namibian BC Corp		6060af
0500	0600	DRM/ as	Netherlands, Radio	15255au	6175al
0500	0600		New Zealand, Radio NZ Intl		15340pa
0500	0600		Nigeria, Radio/Enugu		6025do
0500	0600		Nigeria, Radio/Ibadan		6050do
0500	0600		Nigeria, Radio/Kaduna		4770do
0500	0600		Nigeria, Radio/Lagos		3326do
0500	0600		Nigeria, Voice of	17800af	
0500	0600		Russia, Voice of	7125na	7180na
			12010na	15445na	15595na
0500	0600		Sierra Leone, Radio UNAMSIL	6139af	
0500	0600		Singapore, MediCorp Radio	6150do	
0500	0600	vi	Solomon Islands, SIBC	5020do	9545do
0500	0600		South Africa, Channel Africa	9525af	11710af
0500	0600		Swaziland, TWR	6120af	7205af
0500	0600		Uganda, Radio	4976do	5026do
0500	0600		UK, BBC World Service	6005af	6135ca
			6190af 6195eu	7160af	9410eu
			11765af	11940af	11955as
			15360as	15420af	15565eu
			17640af	17760as	17790as
0500	0600		USA, Armed Forces Radio	4319usb	5446usb
			5765usb	6350usb	7507usb
			12133usb	12579usb	13362usb
0500	0600		USA, KALJ Dallas TX	5755va	
0500	0600		USA, KLTN Salt Lake City UT		7505na
0500	0600		USA, KWHR Naalehu HI		17780as
0500	0600		USA, Voice of America	6035af	6080af
			6105af 6170va	7295af	9700va
			11835af	13710af	15205va
0500	0600		USA, WBCQ Kennebunk ME		7415na
0500	0600	twfha	USA, WBCQ Kennebunk ME		9330na
0500	0600	m	USA, WBCQ Kennebunk ME		5105na
0500	0600		USA, WBOH Newport NC		5920am
0500	0600		USA, WEWN Birmingham AL		5825na
0500	0600		USA, WHRA Greenbush ME		7580af
0500	0600		USA, WHRI Noblesville IN		5745va
0500	0600		USA, WINB Red Lion PA		9320am
0500	0600		USA, WJIE Louisville KY		7490am
			13595am		
0500	0600	mtwhf	USA, WMLK Bethel PA		9465eu
0500	0600		USA, WRMI Miami FL		7385na
0500	0600		USA, WTJC Newport NC		9370na
0500	0600		USA, WWCR Nashville TN		3210na
			5770na	5935na	5070na
0500	0600		USA, WWRB Manchester TN		5050na
			6890na		
0500	0600		USA, WYFR Okeechobee FL		6855eu
			7355va	9505na	7520eu
0500	0600	vi	Vanuatu, Radio	3945al	7260do
0500	0600		Zambia, Radio	4910do	
0500	0600	vi	Zambia, Radio Christian Voice		6065do
0500	0600		Zimbabwe, ZBC Corp		5975do
0515	0525		Rwanda, Radio	6005do	
0525	0600	vi	Ghana, Ghana BC Corp		3366do
0530	0545		UK, BBC World Service		6010eu
0530	0550		UAE, Radio Dubai	13675au	15435au
			21700au		17830au
0530	0600		Thailand, Radio	13780eu	
0530	0600	mtwhf	UK, BBC World Service		17885af

Shortwave Guide



0600 UTC - 2AM EDT / 1AM CDT / 11PM PDT

0600	0615	South Africa, TWR	11640af		
0600	0620	Vatican City, Vatican Radio	4005eu	5890eu	
		7250eu			
0600	0630	France, Radio France Intl	11725af	15155af	
		17800af			
0600	0630	Swaziland, TWR	6120af	7205af	9500af
0600	0700	Anguilla, Caribbean Beacon	6090am		
0600	0700	Australia, ABC NT Alice Springs	2310irr	4835do	
0600	0700	Australia, ABC NT Katherine	5025do		
0600	0700	Australia, ABC NT Tennant Creek	4910do		
0600	0700	Australia, Radio	9660pa	11880pa	12080va
		15160as	15240pa	15515va	17750as
0600	0700	Botswana, Radio	4820do	4830al	7255do
0600	0700	Canada, CFRX Toronto ON	6070do		
0600	0700	Canada, CFVP Calgary AB	6030do		
0600	0700	Canada, CKZN St John's NF	6160do		
0600	0700	Canada, CKZU Vancouver BC	6160do		
0600	0700	Costa Rica, University Network	5030am	6150am	
		7375am	9725sa	11870am	13750na
		17645as			
0600	0700	Cuba, Radio Havana	9550am	9820na	
		11760na			
0600	0700	1st a	Finland, Scandinavian Weekend Radio	6170eu	
		11690eu			
0600	0700	Georgia, Radio Georgia	11805eu		
0600	0700	Germany, Deutsche Welle	6140eu	7225af	
		11785af	15410af		
0600	0700	vi	Ghana, Ghana BC Corp	3366do	4915do
0600	0700		Guyana, Voice of	3291do	
0600	0700		Japan, Radio	7230eu	11740as
			15195as	17870pa	
0600	0700		Kuwait, Radio	15110as	
0600	0700		Liberia, ELWA	4760do	
0600	0700		Malaysia, RTM Radio 4	7295do	
0600	0700		Malaysia, Voice of	6175as	9750as
			15295au		
0600	0700		Namibia, Namibian BC Corp	6060af	6175al
0600	0700		New Zealand, Radio NZ Intl	15340pa	
0600	0700		Nigeria, Radio/Enugu	6025do	
0600	0700		Nigeria, Radio/Ibadan	6050do	
0600	0700		Nigeria, Radio/Kaduna	4770do	6090do
0600	0700		Nigeria, Radio/Lagos	3326do	4990do
0600	0700		Nigeria, Voice of	17800af	
0600	0700		Papua New Guinea, NBC	4890do	9675irr
0600	0700		Russia, Voice of	21790pa	
0600	0700		Sierra Leone, Radio UNAMSIL	6139af	
0600	0700		Singapore, Mediaport Radio	6150do	
0600	0700	vi	Solomon Islands, SIBC	5020do	9545do
0600	0700		South Africa, Channel Africa	9525af	15215af
0600	0700		Swaziland, TWR	7205af	
0600	0700	as	UK, BBC World Service	17885af	
0600	0700		UK, BBC World Service	6055af	6190af
			6195eu	7160af	11765af
			11940af	11955as	15310as
			15360as	15400af	15575me
			17640af	17760as	21660as
0600	0700		USA, Armed Forces Radio	4319usb	5446usb
			5765usb	6350usb	7507usb
			12133usb	12579usb	13362usb
0600	0700		USA, KALJ Dallas TX	5755va	
0600	0700		USA, KTNB Salt Lake City UT	7505na	
0600	0700		USA, KWHR Naalehu HI	17780as	
0600	0700		USA, Voice of America	5995va	6035af
			6080af	6105af	7170va
			11835af	11930va	11995af
0600	0700	m	USA, WBCQ Kennebunk ME	5105na	
0600	0700	tw hfa	USA, WBCQ Kennebunk ME	9330na	
0600	0700		USA, WBOH Newport NC	5920am	
0600	0700		USA, WEWN Birmingham AL	5825na	7570va
0600	0700		USA, WHRA Greenbush ME	7580af	
0600	0700		USA, WHRI Noblesville IN	5745va	7315am
0600	0700		USA, WJIE Louisville KY	7490am	11515va
			13595am		
0600	0700		USA, WRMI Miami FL	7385na	
0600	0700		USA, WTJC Newport NC	9370na	
0600	0700		USA, WWCR Nashville TN	3210na	5070na
			5770na	5935na	
0600	0700		USA, WWRB Manchester TN	5050na	5085na
			6890na		
0600	0700		USA, WYFR Okeechobee FL	7355eu	11530eu
			11580eu		
0600	0700	vi	Vanuatu, Radio	3945al	4960do
0600	0700		Yemen, Rep of Yemen Radio	9780me	
0600	0700		Zambia, Radio Christian Voice	9865do	
0600	0700	vi	Zimbabwe, ZBC Corp	5975do	
0605	0630	s	Austria, Radio Austria Intl	17870me	
0630	0645	as	UK, BBC World Service	9875eu	
0630	0700		Vatican City, Vatican Radio	9660af	11625af
			13765af		
0635	0700	s	Austria, Radio Austria Intl	17870me	

0700 UTC - 3AM EDT / 2AM CDT / 12AM PDT

0700	0715	Croatia, Voice of	13820pa		
0700	0726	Romania, Radio Romania Intl	11775na	15105na	
0700	0727	Slovakia, Radio Slovakia Intl	13715au	15460au	
		17550au			
0700	0730	a	Tibet, Xizang PBS	9490as	9580as
0700	0730	as	UK, BBC World Service	17885af	
0700	0745		USA, WYFR Okeechobee FL	7355eu	9985af
0700	0800		Anguilla, Caribbean Beacon	6090am	
0700	0800		Australia, ABC NT Alice Springs	2310irr	4835do
0700	0800		Australia, ABC NT Katherine	5025do	
0700	0800		Australia, ABC NT Tennant Creek	4910do	
0700	0800		Australia, Radio	9660pa	11880pa
			13630pa	15160as	15240va
0700	0800	vi	Botswana, Radio	4820do	4830al
0700	0800		Canada, CFRX Toronto ON	6070do	
0700	0800		Canada, CFVP Calgary AB	6030do	
0700	0800		Canada, CKZN St John's NF	6160do	
0700	0800		Canada, CKZU Vancouver BC	6160do	
0700	0800		Costa Rica, University Network	5030am	6150am
			7375am	9725sa	11870am
			17645as		
0700	0800		Eat Guinea, Radio Africa	15184af	
0700	0800	1st a	Finland, Scandinavian Weekend Radio	6170eu	
			11690eu		
0700	0800		France, Radio France Intl	15605af	
0700	0800		Germany, Deutsche Welle	6140eu	
0700	0800	vi	Ghana, Ghana BC Corp	3366do	4915do
0700	0800		Guyana, Voice of	3291do	
0700	0800		Kuwait, Radio	15110as	
0700	0800		Liberia, ELWA	4760do	
0700	0800		Malaysia, Radio Malaysia Kota	Kinabalu	5979do
0700	0800		Malaysia, RTM Radio 4	7295do	
0700	0800		Malaysia, Voice of	6175as	9750as
			15295au		
0700	0800		Myanmar, Radio	9730do	
0700	0800		New Zealand, Radio NZ Intl	15340pa	
0700	0800		Nigeria, Radio Enugu	6025do	
0700	0800		Nigeria, Radio/Ibadan	6050do	
0700	0800		Nigeria, Radio/Kaduna	4770do	6090do
0700	0800		Nigeria, Radio/Lagos	3326do	4990do
0700	0800		Nigeria, Voice of	17800af	
0700	0800		Papua New Guinea, NBC	4890do	9675irr
0700	0800		Russia, Voice of	21790pa	
0700	0800		Sierra Leone, Radio UNAMSIL	6139af	
0700	0800		Singapore, Mediaport Radio	6150do	
0700	0800	vi	Solomon Islands, SIBC	5020do	9545do
0700	0800		South Africa, Channel Africa	9525af	
0700	0800		Swaziland, TWR	7205af	
0700	0800		Taiwan, Radio Taiwan Intl	5950na	
0700	0800		UK, BBC World Service	6190af	6195eu
			9410eu	11760me	11765af
			11955as	12095eu	15310as
			15400af	15485eu	15565eu
			17760as	17790as	21660as
0700	0800		USA, Armed Forces Radio	4319usb	5446usb
			5765usb	6350usb	7507usb
			12133usb	12579usb	13362usb
0700	0800		USA, KTNB Salt Lake City UT	7505na	
0700	0800		USA, KWHR Naalehu HI	11565pa	17780as
0700	0800	m	USA, WBCQ Kennebunk ME	5105na	
0700	0800		USA, WBCQ Kennebunk ME	7415na	
0700	0800		USA, WBOH Newport NC	5920am	
0700	0800		USA, WEWN Birmingham AL	5825na	7570va
0700	0800		USA, WHRA Greenbush ME	7580af	
0700	0800		USA, WHRI Noblesville IN	5745va	7315am
0700	0800	mtwhf	USA, WMLK Bethel PA	9465eu	
0700	0800		USA, WRMI Miami FL	7385na	
0700	0800		USA, WTJC Newport NC	9370na	
0700	0800		USA, WWCR Nashville TN	3210na	5070na
			5770na	5935na	
0700	0800	vi	Vanuatu, Radio	3945al	4960do
0700	0800		Zambia, Radio Christian Voice	9865do	7260irr
0705	0720		UK, BBC World Service	6005af	
0715	0730		UK, BBC World Service	15575me	
0730	0745	mtwhf	Vatican City, Vatican Radio	4005eu	5890eu
			6185eu	7250eu	9645va
			15595va		
0730	0800		Australia, HCB	11750pa	
0730	0800		Bulgaria, Radio	11600eu	13600eu
0730	0800	as	Guam, TWR/KTWR	15205as	
0730	0800		Switzerland, Swiss Radio Intl	9885af	13790af
			17665af		
0730	0800	as	UK, BBC World Service	15575me	17885af
0740	0800	mtwhf	Guam, TWR/KTWR	15205as	
0745	0800	as	Albania, TWR	12070eu	
0745	0800		Guam, TWR/KTWR	15330as	
0745	0800	as	Monaco, TWR	9870eu	
0755	0800	mtwhf	Albania, TWR	12070eu	
0755	0800	mtwhf	Monaco, TWR	9870eu	

0800 UTC - 4AM EDT / 3AM CDT / 1AM PDT

0800	0804	Pakistan, Radio	17835eu	21465eu	
0800	0825	Malaysia, Voice of	6175as	9665as	9750as

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0800	0827		15295au			
0800	0829		Czech Rep, Radio Prague Intl	7345eu	9880eu	
0800	0830		Belgium, Radio Vlaanderen Intl	5965eu		
0800	0830		Australia, ABC NT Katherine	5025do		
0800	0830		Australia, ABC NT Tennant Creek	4910do		
0800	0830		Malaysia, Radio Malaysia Kota Kinabalu		5979do	
0800	0830		Myanmar, Radio	9730do		
0800	0850	a	Monaco, TWR	9870eu		
0800	0900	smtwhf	Albania, TWR	12070eu		
0800	0900		Anguilla, Caribbean Beacon	6090am		
0800	0900		Australia, ABC NT Alice Springs	2310irr	4835do	
0800	0900		Australia, HCJB	11750pa		
0800	0900		Australia, Radio	5995na	9580va	9590as
0800	0900			9710pa	12080va	13630as
0800	0900			15415as		15240va
0800	0900	vi	Botswana, Radio	4820do	4830al	7255do
0800	0900		Canada, CFRX Toronto ON	6070do		
0800	0900		Canada, CFVP Calgary AB	6030do		
0800	0900		Canada, CKZN St John's NF	6160do		
0800	0900		Canada, CKZU Vancouver BC	6160do		
0800	0900		Costa Rica, University Network	5030am	6150am	
0800	0900			7375am	9725sa	11870am
0800	0900			17645as		13750na
0800	0900	1st a	Eat Guinea, Radio Africa	15184af		
0800	0900		Finland, Scandinavian Weekend Radio		6170eu	
0800	0900			11690eu		
0800	0900		Germany, Bible Voice Broadcasting		5975eu	
0800	0900		Germany, Deutsche Welle	6140eu		
0800	0900	DRM	Germany, Deutsche Welle	15440af	21675af	
0800	0900	vi	Ghana, Ghana BC Corp	3366do	4915do	
0800	0900	as	Guam, TWR/KTWR	15205as		
0800	0900	mtwhf	Guam, TWR/KTWR	15205as	15330as	
0800	0900		Guyana, Voice of	3291do	5950do	
0800	0900		Indonesia, Voice of	9525pa	15150as	
0800	0900		Liberia, ELWA	4760do		
0800	0900		Malaysia, RTM Radio 4		7295do	
0800	0900	mtwhfs	Monaco, TWR	9870eu		
0800	0900		New Zealand, Radio NZ Intl	9885pa		
0800	0900		Nigeria, Radio Enugu	6025do		
0800	0900		Nigeria, Radio/Ibadan	6050do		
0800	0900		Nigeria, Radio/Kaduna	4770do	6090do	
0800	0900		Nigeria, Radio/Lagos	3326do	4990do	
0800	0900		Nigeria, Voice of	17800af		
0800	0900		Papua New Guinea, NBC	4890do	9675irr	
0800	0900		Russia, Voice of	17495pa	17525pa	17665pa
0800	0900			21790pa		
0800	0900		Sierra Leone, Radio UNAMSIL	6139af		
0800	0900		Singapore, Mediastar Radio	6150do		
0800	0900	vi	Solomon Islands, SIBC	5020do	9545do	
0800	0900	s	South Africa, Amateur Radio League		9750af	
0800	0900			17780af		
0800	0900	a	South Africa, Radio League	9750af	17780af	
0800	0900		South Korea, Radio Korea Intl	9570as	13670eu	
0800	0900		Swaziland, TWR	7205af	9500af	
0800	0900		Taiwan, Radio Taiwan Intl	9610au		
0800	0900		UK, BBC World Service	6190af	9410eu	
0800	0900			11760me	11940af	12095eu
0800	0900			15310as	15360as	15485eu
0800	0900			15565eu	17640eu	17760as
0800	0900			17830af	17885af	21470af
0800	0900				15575me	21660as
0800	0900	as	UK, BBC World Service	15575me		
0800	0900		USA, Armed Forces Radio	4319usb	5446usb	
0800	0900			5765usb	6350usb	7507usb
0800	0900			12133usb	12579usb	13362usb
0800	0900				11765as	13855usb
0800	0900		USA, KNLS Anchor Point AK		7505na	
0800	0900		USA, KTNB Salt Lake City UT		9930as	11565pa
0800	0900		USA, KWHR Naalehu HI		5920am	
0800	0900		USA, WBOH Newport NC		5825na	
0800	0900		USA, WERN Birmingham AL		5745va	7315am
0800	0900		USA, WHRI Noblesville IN		7490am	11515va
0800	0900			13595am		
0800	0900	mtwhf	USA, WMLK Bethel PA	9465eu		
0800	0900		USA, WRMI Miami FL	7385na		
0800	0900		USA, WTJC Newport NC	9370na		
0800	0900		USA, WWCR Nashville TN	3210na	5070na	
0800	0900			5770na	5935na	
0800	0900		USA, WYFR Okeechobee FL	9985eu		
0800	0900	vi	Vanuatu, Radio	3945al	4960do	7260irr
0800	0900		Zambia, Radio Christian Voice	9865do		
0815	0900	as	Guam, TWR/KTWR	15330as		
0830	0900		Australia, ABC NT Katherine	2485do		
0830	0900		Australia, ABC NT Tennant Creek	2325do		
0830	0900		Austria, AWR Europe	9660af		
0830	0900		Georgia, Radio Georgia	11910eu		
0830	0900		Switzerland, Swiss Radio Intl	21770af		

0900 UTC - 5AM EDT / 4AM CDT / 2AM PDT

0900	0915	as	Germany, Bible Voice Broadcasting	5975eu		
0900	0915	vi	Ghana, Ghana BC Corp	3366do	4915do	
0900	0920	smtwhf	Albania, TWR	12070eu		
0900	0920	s	Monaco, TWR	9870eu		
0900	0930	mtwhf	Guam, TWR/KTWR	15330as		
0900	0930	as/vi	Italy, IRRS	13840va		
0900	0956		China, China Radio Intl		15210pa	17690pa
0900	1000		Anguilla, Caribbean Beacon	6090am		

0900	1000		Australia, ABC NT Alice Springs	2310do	4835irr	
0900	1000		Australia, ABC NT Katherine	2485do		
0900	1000		Australia, ABC NT Tennant Creek	2325do		
0900	1000		Australia, HCJB	11750pa		
0900	1000		Australia, Radio	9580va	9590as	11880as
0900	1000			15240va	15415as	
0900	1000		Australia, Voice Intl	11955as		
0900	1000	vi	Botswana, Radio	4820do	4830al	7255do
0900	1000		Canada, CFRX Toronto ON	6070do		
0900	1000		Canada, CFVP Calgary AB	6030do		
0900	1000		Canada, CKZN St John's NF	6160do		
0900	1000		Canada, CKZU Vancouver BC	6160do		
0900	1000		Costa Rica, University Network	5030am	6150am	
0900	1000			7375am	9725sa	11870am
0900	1000			17645as		13750na
0900	1000		Eat Guinea, Radio Africa	15184af		
0900	1000	1st a	Finland, Scandinavian Weekend Radio		6170eu	
0900	1000			11690eu		
0900	1000	DRM/ m-f	Germany, Deutsche Welle	15440af	17700af	
0900	1000			21675af		
0900	1000		Germany, Deutsche Welle	6140eu	15440af	
0900	1000		Guyana, Voice of	3291do	5950do	
0900	1000		Malaysia, RTM Radio 4		7295do	
0900	1000		New Zealand, Radio NZ Intl	9885pa		
0900	1000		Nigeria, Radio Enugu	6025do		
0900	1000		Nigeria, Radio/Ibadan	6050do		
0900	1000		Nigeria, Radio/Kaduna	4770do	6090do	
0900	1000		Nigeria, Radio/Lagos	3326do	4990do	
0900	1000		Nigeria, Voice of	17800af		
0900	1000		Palau, KHBN	15725as		
0900	1000		Papua New Guinea, NBC	4890do	9675irr	
0900	1000		Russia, Voice of	17495pa	17525pa	17665pa
0900	1000		Singapore, Mediastar Radio	6150do		
0900	1000	vi	Solomon Islands, SIBC	5020do	9545do	
0900	1000	s	UAE, Radio UNMEE21460af			
0900	1000		UK, BBC World Service	6190af	6195as	
0900	1000			9605as	9740as	11760me
0900	1000			15190as	15310as	15360as
0900	1000			15485eu	15565eu	15575me
0900	1000			17760as	17790as	17830af
0900	1000			21470af	21660as	
0900	1000		USA, Armed Forces Radio	4319usb	5446usb	
0900	1000			5765usb	6350usb	7507usb
0900	1000			12133usb	12579usb	13362usb
0900	1000		USA, KTNB Salt Lake City UT	7505na		
0900	1000		USA, KWHR Naalehu HI	9930as	11565pa	
0900	1000		USA, WBOH Newport NC	5920am		
0900	1000		USA, WERN Birmingham AL	5825na		
0900	1000		USA, WHRA Greenbush ME	7580af		
0900	1000		USA, WHRI Noblesville IN	5745va	7315am	
0900	1000		USA, WJIE Louisville KY	7490am	11515va	
0900	1000			13595am		
0900	1000		USA, WRMI Miami FL	7385na		
0900	1000		USA, WTJC Newport NC	9370na		
0900	1000		USA, WWCR Nashville TN	3210na	5070na	
0900	1000			5770na	5935na	
0900	1000	vi	Vanuatu, Radio	3945al	4960do	7260irr
0900	1000		Zambia, Radio Christian Voice	9865do		
0910	0930	s	Armenia, Voice of	4810eu	15270as	
0930	1000		Georgia, Radio Georgia	11910me		
0930	1000		Greece, Voice of	9420eu	12105eu	15630eu
0930	1000		Lithuania, Radio Vilnius	9710eu		
0945	0959	DRM	Netherlands, FEBA	9850eu		
0945	1000		Serbia & Montenegro, Intl Radio	9850eu		

1000 UTC - 6AM EDT / 5AM CDT / 3AM PDT

1000	1027		Vietnam, Voice of	9840as	12020as	
1000	1029		Czech Rep, Radio Prague Intl		21745va	
1000	1030		Germany, Deutsche Welle		6205as	15190as
1000	1030			17820as		
1000	1030		Guam, AWR/KSDA	11705as	11900as	
1000	1030		Mongolia, Voice of	12085as		
1000	1030	as	UK, BBC World Service	9605as	15360as	
1000	1030		UK, BBC World Service	15190sa	15400af	
1000	1030			17830af		
1000	1045		USA, KWHR Naalehu HI	9930as	11565pa	
1000	1055		Netherlands, Radio	7315as	9785au	12065as
1000	1055			12070pa	12080pa	13820as
1000	1055	DRM	Netherlands, Radio	9850pa		
1000	1056		China, China Radio Intl		15210pa	17690pa
1000	1056		North Korea, Voice of		3560as	9335am
1000	1100			9850as	11709am	11735as
1000	1100		Anguilla, Caribbean Beacon		11775am	
1000	1100		Australia, ABC NT Alice Springs	2310do	4835irr	
1000	1100		Australia, ABC NT Katherine	2485do		
1000	1100		Australia, ABC NT Tennant Creek	2325do		
1000	1100		Australia, HCJB	11750pa		
1000	1100		Australia, Radio	9580va	9590as	11880as
1000	1100			15240va	15415as	
1000	1100		Australia, Voice Intl	11955as	13685as	
1000	1100		Canada, CFRX Toronto ON	6070do		
1000	1100		Canada, CFVP Calgary AB	6030do		
1000	1100		Canada, CKZN St John's NF	6160do		
1000	1100		Canada, CKZU Vancouver BC	6160do		
1000	1100		Costa Rica, University Network	5030am	6150am	
1000	1100			7375am	9725sa	11870am
1000	1100					13750na

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1000	1100		17645as		
1000	1100	1st a	Eat Guinea, Radio Africa	15184af	
			Finland, Scandinavian Weekend Radio	6170eu	
			11720eu		
1000	1100	mtwhf	Germany, Deutsche Welle	17700va	
1000	1100	DRM/ m-f	Germany, Deutsche Welle	15440eu	17700eu
1000	1100	DRM	Germany, Deutsche Welle	6140eu	
1000	1100		Guyana, Voice of	3291do	5949do
1000	1100		India, All India Radio	7270as	13710as
			15020as	15235as	15260as
			17800as	17895au	
1000	1100	as/vl	Italy, IRRS	13840va	
1000	1100		Japan, Radio	6120na	9695as
			17585eu	21755pa	
1000	1100		Malaysia, RTM Radio 4	7295do	
1000	1100		New Zealand, Radio NZ Intl	9885pa	
1000	1100		Palau, KHBN	15725as	
1000	1100		Papua New Guinea, NBC	4890do	9675irr
1000	1100		Singapore, Mediacorp Radio	6150do	
1000	1100	vl	Solomon Islands, SIBC	5020do	9545do
1000	1100		South Africa, Radio Veritas	7240af	
1000	1100		UK, BBC World Service	6190af	6195va
			9740as	11760me	12095eu
			15485eu	15565eu	15575me
			17760as	17790as	17885af
1000	1100	DRM	UK, BBC World Service	7320eu	
1000	1100	DRM/ m	UK, Christian Voice	9760eu	
1000	1100		USA, Armed Forces Radio	4319usb	5446usb
			5765usb	6350usb	7507usb
			12133usb	12579usb	13362usb
1000	1100		USA, KTNB Salt Lake City UT	7505na	
1000	1100		USA, WBOH Newport NC	5920am	
1000	1100		USA, WERN Birmingham AL	5825na	
1000	1100		USA, WHRI Noblesville IN	9495am	9840na
1000	1100		USA, WJIE Louisville KY	7490am	11515va
			13595am		
1000	1100		USA, WRMI Miami FL	9955am	
1000	1100		USA, WTJC Newport NC	9370na	
1000	1100		USA, WWCN Nashville TN	5070na	5770na
			5935na	9435na	
1000	1100		USA, WYFR Okeechobee FL	5950na	
1000	1100	mtwhfa.vl	Vanuatu, Radio	3945al	4960do
1000	1100		Zambia, Radio Christian Voice	9865do	7260irr
1030	1045	mtwhf	Ethiopia, Radio	5990do	7110do
1030	1100		Germany, Deutsche Welle	15440va	
1030	1100	mt hfa	Guam, AWR/KSDA	11900as	
1030	1100		Iran, Voice of the Islamic Rep	15480as	15550as
1030	1100		UAE, Radio Dubai	13675eu	15435eu
			21605eu		
1030	1100	t	UAE, Radio UNMEE	21550af	
1030	1100		UK, BBC World Service	9605as	11945as
			15285as	21660as	
1030	1100	as	UK, BBC World Service	15400af	17830af
1030	1100	mt hfa	Vatican City, Vatican Radio	5890eu	
1045	1100		USA, KWHR Naalehu HI	9930as	
1045	1100	as	USA, KWHR Naalehu HI	11565pa	

1100 UTC - 7AM EDT / 6AM CDT / 4AM PDT

1100	1104		Pakistan, Radio	17835eu	21465eu
1100	1115	mtwhfa.vl	Vanuatu, Radio	3945al	4960do
1100	1127		Vietnam, Voice of	7285as	7260irr
1100	1130		Australia, HCJB	11750pa	
1100	1130		Tibet, Xizang PBS	4920as	6110as
1100	1130	t	UAE, Radio UNMEE	21550af	9490as
1100	1130		UK, BBC World Service	15400af	
1100	1130	mtwhf	UK, BBC World Service	6195ca	15190ca
1100	1155		Netherlands, Radio	9850va	
1100	1155	DRM/ m-f	UK, BBC World Service	17710eu	
1100	1200		Anguilla, Caribbean Beacon	11775am	
1100	1200		Australia, ABC NT Alice Springs	2310do	4835irr
1100	1200		Australia, ABC NT Katherine	2485do	
1100	1200		Australia, ABC NT Tennant Creek	2325do	
1100	1200		Australia, Radio	5995pa	6035va
			9475as	9580va	9590as
1100	1200		Australia, Voice Intl	13685as	15240va
1100	1200		Canada, CFRX Toronto ON	6070do	
1100	1200		Canada, CFVP Calgary AB	6030do	
1100	1200		Canada, CKZN St John's NF	6160do	
1100	1200		Canada, CKZU Vancouver BC	6160do	
1100	1200		Costa Rica, University Network	5030am	6150am
			7375am	9725sa	11870am
			17645as		
1100	1200		Ecuador, HCJB	21455va	
1100	1200	1st a	Finland, Scandinavian Weekend Radio	6170eu	
			11720eu		
1100	1200		Germany, Deutsche Welle	17670as	21650as
1100	1200	DRM	Germany, Deutsche Welle	15440eu	
1100	1200		Germany, Overcomer Ministries	6110eu	9485eu
			9610eu	11950eu	13820eu
			17485af	17735as	21720af
1100	1200		Iran, Voice of the Islamic Rep	15480as	15550as
			21470as	21730as	
1100	1200	as/vl	Italy, IRRS	13840va	
1100	1200		Japan, Radio	6120na	9695as
1100	1200		Malaysia, RTM Radio 4	7295do	11730as
1100	1200	DRM	Netherlands, Radio	21780eu	

1100	1200		New Zealand, Radio NZ Intl	15530pa	
1100	1200		Papua New Guinea, NBC	4890do	9675irr
1100	1200		Singapore, Radio Singapore Intl	6150as	9600as
1100	1200		South Africa, Channel Africa	9525af	
1100	1200		South Africa, Radio Veritas	7240af	
1100	1200		Taiwan, Radio Taiwan Intl	7445as	
1100	1200	DRM/ as	UK, BBC World Service	9410eu	
1100	1200	DRM	UK, BBC World Service	7320eu	21780eu
1100	1200		UK, BBC World Service	6190af	6195va
			9740as	11760me	11940af
			15310as	15485eu	15565eu
			17640eu	17760as	17790as
			17885af	21470af	
1100	1200		USA, Armed Forces Radio	4319usb	5446usb
			5765usb	6350usb	7507usb
			12133usb	12579usb	13362usb
1100	1200		USA, KTNB Salt Lake City UT	7505na	
1100	1200	as	USA, KWHR Naalehu HI	11565pa	
1100	1200	mtwhf	USA, KWHR Naalehu HI	9930as	
1100	1200		USA, WBOH Newport NC	5920am	
1100	1200		USA, WERN Birmingham AL	5825na	
1100	1200		USA, WHRI Noblesville IN	9495am	9840na
1100	1200		USA, WINB Red Lion PA	9320am	
1100	1200		USA, WJIE Louisville KY	7490am	11515va
			13595am		
1100	1200		USA, WRMI Miami FL	9955am	
1100	1200		USA, WTJC Newport NC	9370na	
1100	1200		USA, WWCN Nashville TN	5070na	5770na
			5935na	15825na	
1100	1200		USA, WYFR Okeechobee FL	5950na	7355na
			9555sa	11725sa	11830na
1100	1200		Zambia, Radio Christian Voice	9865do	
1110	1120		Israel, Kol Israel	15640va	17535va
1115	1145		Nepal, Radio	3230as	5005as
			7164as		
1130	1145		Germany, Bible Voice Broadcasting	13590as	
1130	1145		UK, BBC World Service	7135as	11920as
1130	1157		Czech Rep, Radio Prague Intl	11640eu	21745va
1130	1159		Belgium, Radio Vlaanderen Intl	9945as	
1130	1200		South Korea, Radio Korea Intl	9650na	
1130	1200	a	UK, Wales Radio Intl	17625au	
1130	1200	f	Vatican City, Vatican Radio	15595va	17515va
1145	1155		Rwanda, Radio	6055do	
1145	1200		Germany, Bible Voice Broadcasting	13590as	

1200 UTC - 8AM EDT / 7AM CDT / 5AM PDT

1200	1215	vl	Cambodia, National Radio Of	11940as	
1200	1230		France, Radio France Intl	17815af	25820af
1200	1230		Iran, Voice of the Islamic Rep	15480as	15550as
			21470as	21730as	
1200	1230		South Korea, Radio Korea Intl	9650na	
1200	1230		UAE, AWR Africa	15135as	
1200	1230	as	UK, BBC World Service	6195ca	15190am
1200	1230		Uzbekistan, Radio Tashkent Intl	5060as	5975as
			6025as	9715as	
1200	1255		Netherlands, Radio	5965na	
1200	1256		China, China Radio Intl	9730as	9760pa
			11760pa	11980as	15415pa
1200	1259		Canada, Radio Canada Intl	9795as	11730as
1200	1300		Anguilla, Caribbean Beacon	11775am	
1200	1300		Australia, ABC NT Alice Springs	2310do	4835irr
1200	1300		Australia, ABC NT Katherine	2485do	
1200	1300		Australia, ABC NT Tennant Creek	2325do	
1200	1300		Australia, Radio	5995pa	6020pa
			9475as	9580va	9590as
1200	1300		Australia, Voice Intl	13685as	
1200	1300		Canada, CBC Northern Service	9625do	
1200	1300		Canada, CFRX Toronto ON	6070do	
1200	1300		Canada, CFVP Calgary AB	6030do	
1200	1300		Canada, CKZN St John's NF	6160do	
1200	1300		Canada, CKZU Vancouver BC	6160do	
1200	1300		Costa Rica, University Network	5030am	6150am
			7375am	9725sa	11870am
			17645as		
1200	1300		Ecuador, HCJB	21455va	
1200	1300	1st a	Finland, Scandinavian Weekend Radio	6170eu	
			11720eu		
1200	1300		Germany, Deutsche Welle	9655eu	15440eu
1200	1300	as/vl	Italy, IRRS	13840va	
1200	1300		Malaysia, RTM Radio 4	7295do	
1200	1300	DRM	Netherlands, Radio	21780eu	
1200	1300		New Zealand, Radio NZ Intl	15530pa	
1200	1300		Papua New Guinea, NBC	4890do	9675irr
1200	1300		Singapore, Radio Singapore Intl	6150as	9600as
1200	1300		South Africa, Channel Africa	9525af	
1200	1300		South Africa, Radio Veritas	7240af	
1200	1300		Taiwan, Radio Taiwan Intl	7130as	
1200	1300	DRM	UK, BBC World Service	7320eu	21780eu
1200	1300	DRM/ as	UK, BBC World Service	9410eu	
1200	1300		UK, BBC World Service	6190af	6195as
			9740as	11760me	11940af
			15485eu	15565eu	15575me
			17760as	17790as	17830af
			21470af		
1200	1300		Ukraine, Radio Ukraine Intl	15520eu	
1200	1300		USA, Armed Forces Radio	4319usb	5446usb

Shortwave Guide



1200	1300		5765usb	6350usb	7507usb	10320usb
1200	1300		12133usb	12579usb	13362usb	13855usb
1200	1300	as	USA, KTNB Salt Lake City UT	7505na		
1200	1300		USA, KWHR Naalehu HI	9930as		
1200	1300		USA, KWHR Naalehu HI	11565pa		
1200	1300		USA, Voice of America	6110va	9645va	
			9760va	11705va	15250va	
			15425va			
1200	1300		USA, WBOH Newport NC	5920am		
1200	1300		USA, WEWN Birmingham AL	5825na		
1200	1300		USA, WHRI Noblesville IN	9495am	9840na	
1200	1300		USA, WINB Red Lion PA	9320am		
1200	1300		USA, WJIE Louisville KY	7490am	11515va	
			13595am			
1200	1300		USA, WRMI Miami FL	15725na		
1200	1300		USA, WTJC Newport NC	9370na		
1200	1300		USA, WWCR Nashville TN	5070na	5770na	
			5935na	15825na		
1200	1300		USA, WYFR Okeechobee FL	5950na	7355na	
			11830na	11970na	13695na	
1200	1300		Zambia, Radio Christian Voice	9865do		
1215	1245	m	Germany, Bible Voice Broadcasting		13590as	
1215	1300		Egypt, Radio Cairo 15445af	17670as		
1230	1245		UK, BBC World Service	15425af	17780af	
			21640af			
1230	1257		Vietnam, Voice of	9840as	12020as	
1230	1300		Australia, HCJB	15405pa		
1230	1300		Bangladesh, Bangla Betar	7185as	9550as	
1230	1300		Bulgaria, Radio	11700eu	15700eu	
1230	1300		Sri Lanka, SLBC	6005as	9770as	15745as
1230	1300		Thailand, Radio	9810as		

1300 UTC - 9AM EDT / 8AM CDT / 6AM PDT

1300	1330		Ecuador, HCJB	21455va		
1300	1330		Egypt, Radio Cairo	15445af	17670as	
1300	1355		Poland, Radio Polonia	9525eu	11820eu	
1300	1356		China, China Radio Intl	9570na	9755pa	
			11760pa	11900as	15180as	
1300	1356		North Korea, Voice of	4405as	7505eu	
			9335na	11335eu	11710am	
1300	1356		Romania, Radio Romania Intl	15105eu	17745eu	
1300	1400		Anguilla, Caribbean Beacon	11775am		
1300	1400		Australia, Radio	5995pa	6020pa	6035va
			9580va	9590as		
1300	1400		Australia, Voice Intl	13685as		
1300	1400		Canada, CBC Northern Service	9625do		
1300	1400		Canada, CFRX Toronto ON	6070do		
1300	1400		Canada, CFPV Calgary AB	6030do		
1300	1400		Canada, CKZN St John's NF	6160do		
1300	1400		Canada, CKZU Vancouver BC	6160do		
1300	1400	mtwhf	Canada, Radio Canada Intl	9515am	13655am	
			17820am			
1300	1400		Costa Rica, University Network	5030am	6150am	
			7375am	9725sa	11870am	13750na
			17645as			
1300	1400	1st a	Finland, Scandinavian Weekend Radio		6170eu	
			11720eu			
1300	1400	DRM	Germany, Deutsche Welle	9655eu	15440eu	
1300	1400		Germany, Deutsche Welle	6140eu	9655va	
			15440va			
1300	1400		Germany, Overcomer Ministries	6110eu	13810me	
1300	1400	as/vl	Italy, IRRS	13840va		
1300	1400		Jordan, Radio	11690eu		
1300	1400		Malaysia, RTM Radio 4	7295do		
1300	1400		New Zealand, Radio NZ Intl	9870pa		
1300	1400		Papua New Guinea, NBC	4890do	9675irr	
1300	1400		Singapore, Radio Singapore Intl	6150as	9600as	
1300	1400		South Africa, Radio Veritas	7240af		
1300	1400		South Korea, Radio Korea Intl	9570as	13670as	
1300	1400		Sri Lanka, SLBC	6005as	9770as	15745as
1300	1400	DRM	UK, BBC World Service	7320eu		
1300	1400	DRM/ m-f	UK, BBC World Service	9410eu		
1300	1400		UK, BBC World Service	6190af	6195va	
			9740as	11760me	12095eu	15190am
			15310as	15420af	15485eu	15565eu
			15575me	17640eu	17760as	17790as
			17830af	17885af	21470af	
1300	1400		USA, Armed Forces Radio	4319usb	5446usb	
			5765usb	6350usb	10320usb	
			12133usb	12579usb	13362usb	13855usb
1300	1400		USA, KNLS Anchor Point AK	9780as		
1300	1400		USA, KTNB Salt Lake City UT	7505na		
1300	1400		USA, KWHR Naalehu HI	9930as		
1300	1400		USA, Voice of America	6110va	9760va	
			11705va	15425va		
1300	1400	mtwhf	USA, WBCQ Kennebunk ME	17495na		
1300	1400		USA, WBOH Newport NC	5920am		
1300	1400		USA, WEWN Birmingham AL	9955na		
1300	1400		USA, WHRA Greenbush ME	17560af		
1300	1400		USA, WHRI Noblesville IN	9840na	15105am	
1300	1400		USA, WINB Red Lion PA	9930am		
1300	1400		USA, WJIE Louisville KY	7490am	11515va	
			13595am			
1300	1400		USA, WRMI Miami FL	15725na		
1300	1400		USA, WTJC Newport NC	9370na		
1300	1400		USA, WWCR Nashville TN	5935na	9475na	

1300	1400		12160na	15825na		
			USA, WYFR Okeechobee FL	7355na	11560as	
			11740na	11830na	11970na	13695na
1300	1400		Zambia, Radio Christian Voice	9865do		
1305	1315	mtwhfa	Turkmenistan, Turkmen Radio	5015as		
1305	1330	as	Austria, Radio Austria Intl	6155eu	13730eu	
1315	1320	mtwhf	Austria, Radio Austria Intl	17855as		
1330	1345		UK, BBC World Service	15105af	21640af	
1330	1350		UAE, Radio Dubai	13630eu	13675eu	15395eu
			17865eu	21605eu		
1330	1357		Vietnam, Voice of	7280eu	9730eu	
1330	1400		Australia, HCJB	15405pa		
1330	1400		Guam, AWR/KSDA	11980as		
1330	1400	mt hfa	Guam, AWR/KSDA	15660as		
1330	1400		India, All India Radio		9690as	11620as
			13710as			
1330	1400		Laos, National Radio	7145as		
1330	1400		Serbia & Montenegro, Intl Radio	11835au		
1330	1400		Sweden, Radio	9430va	17505va	18960va
1330	1400	DRM	Sweden, Radio	9815eu		
1330	1400		Turkey, Voice of	15155va	15195eu	
1330	1400		Uzbekistan, Radio Tashkent Intl	5060as	5975as	
			6025as	9715as		
1335	1345	as	Austria, Radio Austria Intl	6155eu	13730eu	
1345	1400		Austria, Radio Austria Intl	6155eu	13730eu	
1345	1400	mtwhf	Austria, Radio Austria Intl	17855as		

1400 UTC - 10AM EDT / 9AM CDT / 7AM PDT

1400	1415	fa	Germany, Bible Voice Broadcasting		7485as	
1400	1415		Seychelles, FEBA	9445as		
1400	1415	mtw	UK, BBC World Service		11860af	15420af
			21490af			
1400	1420		Turkey, Voice of	15155as	15195eu	
1400	1425		Bhutan, Bhutan BC Service	5030al	6035do	
1400	1429		Czech Rep, Radio Prague Intl	21745va		
1400	1430	DRM	Canada, Radio Canada Intl	9815eu		
1400	1430		Netherlands, Radio	12070as	12080as	15595as
1400	1430		Thailand, Radio	9560as		
1400	1456		China, China Radio Intl	9755na	11675as	
			11765af	13685af	15125na	17720na
1400	1500		Anguilla, Caribbean Beacon		11775am	
1400	1500		Australia, HCJB	15405pa		
1400	1500		Australia, Radio	5995va	6080pa	7240as
			9475as	9590va	11750as	
1400	1500		Australia, Voice Intl	13635as		
1400	1500		Canada, CBC Northern Service	9625do		
1400	1500		Canada, CFRX Toronto ON	6070do		
1400	1500		Canada, CFPV Calgary AB	6030do		
1400	1500		Canada, CKZN St John's NF	6160do		
1400	1500		Canada, CKZU Vancouver BC	6160do		
1400	1500		Canada, Radio Canada Intl	9515am	13655am	
			17820am			
1400	1500		Costa Rica, University Network	5030am	6150am	
			7375am	9725sa	11870am	13750na
			17645as			
1400	1500	1st a	Finland, Scandinavian Weekend Radio		6170eu	
			11720eu			
1400	1500		France, Radio France Intl	7175as	11610as	
			17515as	17620as		
1400	1500		Germany, Deutsche Welle	6140eu		
1400	1500		Germany, Overcomer Ministries	6110eu	13810me	
			15620as	21590sa		
1400	1500		India, All India Radio		9690as	11620as
			13710as			
1400	1500		Japan, Radio	7200as	9845as	11840va
			17755va			
1400	1500		Jordan, Radio	11690eu		
1400	1500		New Zealand, Radio NZ Intl	9870pa		
1400	1500		Oman, Radio	15140eu		
1400	1500	DRM	Russia, Voice of	9495eu		
1400	1500		Singapore, Mediacorp Radio	6150do		
1400	1500	as	South Africa, Channel Africa	9525af		
1400	1500		Sri Lanka, SLBC	6005as	9770as	15745as
1400	1500		Taiwan, Radio Taiwan Intl	15265as		
1400	1500	DRM	UK, BBC World Service	7320eu	9410eu	
1400	1500		UK, BBC World Service	6190af	6195as	
			7160as	9740as	12095eu	15190am
			15310as	15485eu	15565eu	15575me
			17640eu	17790as	17830af	21470af
			21660af			
1400	1500		USA, Armed Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7507usb	10320usb
			12133usb	12579usb	13362usb	13855usb
1400	1500		USA, KJES Vado NM	11715na		
1400	1500		USA, KTNB Salt Lake City UT	7505na		
1400	1500		USA, KWHR Naalehu HI	9930as		
1400	1500		USA, Voice of America	6110va	7125va	
			9645va	9760va	11705va	15205va
			15425va			
1400	1500	mtwhf	USA, WBCQ Kennebunk ME	17495na		
1400	1500		USA, WBOH Newport NC	5920am		
1400	1500		USA, WEWN Birmingham AL	9955na		
1400	1500		USA, WHRA Greenbush ME	17560af		
1400	1500		USA, WHRI Noblesville IN	9840na	15105am	
1400	1500		USA, WINB Red Lion PA	9930am		
1400	1500		USA, WJIE Louisville KY	7490am	11515va	

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1400	1500		13595am		
1400	1500		USA, WRMI Miami FL	15725na	
1400	1500		USA, WTJC Newport NC	9370na	
1400	1500		USA, WWCN Nashville TN	9475na	12160na
			13845na	15825na	
1400	1500	mtwhf	USA, WWRB Manchester TN	9320na	12172na
1400	1500		USA, WYFR Okeechobee FL	11560as	11740na
			11830na	17760am	
1400	1500		Zambia, Radio Christian Voice	9865do	
1415	1420		Nepal, Radio	3230as	5005as
			7164as		6100as
1415	1430	ha	Germany, Bible Voice Broadcasting	7485as	
1430	1445	s ha	Germany, Bible Voice Broadcasting	7485as	
1430	1500	s	Germany, Pan American BC	13605me	
1430	1500		Myanmar, Radio	5040do	5985do
1430	1500	DRM	Netherlands, Radio	9815eu	
1430	1500		Netherlands, Radio	12070as	12080as
1430	1500		Sweden, Radio	17505va	18960va
1445	1500	as	Germany, Bible Voice Broadcasting	7485as	
1445	1500		Guam, TWR/KTWR	15330as	
1445	1500	mtwhfa	UK, BBC World Service	6140as	7205as
			15425as		

1500 UTC - 11AM EDT / 10AM CDT / 8AM PDT

1500	1530		Mongolia, Voice of	9720as	
1500	1530		UK, BBC World Service	21490af	11860af
			21490af		15420af
1500	1545		Guam, TWR/KTWR	15330as	
1500	1555		Netherlands, Radio	12070as	12080as
1500	1556		China, China Radio Intl	7160as	9785as
			11675as	11765as	15125af
			17720na		
1500	1556		North Korea, Voice of	4405as	7505eu
			9335am	11335eu	11710am
1500	1559		Canada, Radio Canada Intl	9515am	9635as
			11935as	13655am	17820am
1500	1600		Anguilla, Caribbean Beacon	11775am	
1500	1600		Australia, HCJB	15405pa	
1500	1600		Australia, Radio	5995va	6080pa
			9475as	9590as	11750as
1500	1600		Australia, Voice Intl	13635as	
1500	1600		Canada, CBC Northern Service	9625do	
1500	1600		Canada, CFRX Toronto ON	6070do	
1500	1600		Canada, CFVP Calgary AB	6030do	
1500	1600		Canada, CKZN St John's NF	6160do	
1500	1600		Canada, CKZU Vancouver BC	6160do	
1500	1600		Costa Rica, University Network	5030am	6150am
			7375am	9725sa	11870am
			17645as		13750na
1500	1600	1st a	Finland, Scandinavian Weekend Radio	5990eu	
			11720eu		
1500	1600		Germany, Deutsche Welle	6140eu	
1500	1600		Germany, Overcomer Ministries	6110eu	13810eu
			21590sa		
1500	1600	s	Germany, Pan American BC	12015me	
1500	1600		Japan, Radio	7200as	9750as
			9845as		
1500	1600		Jordan, Radio	11690na	
1500	1600		Myanmar, Radio	5040do	5985do
1500	1600		New Zealand, Radio NZ Intl	9870pa	
1500	1600	DRM	Russia, Voice of	9495eu	
1500	1600		Russia, Voice of	6205as	7260as
			7350as	11500as	7315as
1500	1600		Seychelles, FEBA	7340as	
1500	1600		Singapore, Mediacorp Radio	6150do	
1500	1600		South Africa, Channel Africa	9525af	17770af
1500	1600		Sri Lanka, SLBC	6005as	9770as
1500	1600	mtwhf	Sudan, Sudan Radio Service	15290af	15745as
1500	1600		UK, BBC World Service	5975as	15530af
			6195as	6190af	6190af
			6195as	7160as	11940af
			12095eu	15190am	15310as
			15485eu	15565eu	15400af
			21470af	21660af	17790as
1500	1600		USA, Armed Forces Radio	4319usb	5446usb
			5765usb	6350usb	10320usb
			12133usb	12579usb	13855usb
1500	1600		USA, KJES Vado NM	11715na	
1500	1600		USA, KTNB Salt Lake City UT	15590na	
1500	1600		USA, KWHR Naalehu HI	9930as	
1500	1600		USA, Voice of America	6110va	7125va
			9575va	9645va	9760va
			9825va	15205va	15395va
1500	1600	mtwhf	USA, WBCQ Kennebunk ME	17495na	
1500	1600		USA, WBOH Newport NC	5920am	
1500	1600		USA, WEWN Birmingham AL	9955na	
1500	1600		USA, WHRA Greenbush ME	17650af	
1500	1600		USA, WHRI Noblesville IN	9840na	15105am
1500	1600		USA, WINB Red Lion PA	9930am	
1500	1600		USA, WJIE Louisville KY	7490am	11515va
			13595am		
1500	1600		USA, WRMI Miami FL	15725na	
1500	1600		USA, WTJC Newport NC	9370na	
1500	1600		USA, WWCN Nashville TN	9475na	12160na
			13845na	15825na	
1500	1600	mtwhf	USA, WWRB Manchester TN	9320na	12172na
1500	1600		USA, WYFR Okeechobee FL	6280as	11830na

1500	1600		15520as	17760na	
1515	1530	as	Zambia, Radio Christian Voice	4965do	
1515	1530		Germany, Bible Voice Broadcasting		9860me
			Vatican City, Vatican Radio	9865as	13765as
			15235as		
1530	1600		Germany, Bible Voice Broadcasting		12005me
1530	1600	m whfa	Germany, Bible Voice Broadcasting		9705as
1530	1600		Iran, Voice of the Islamic Rep	7190as	9610as
1530	1600		UAE, AWR Africa	15225as	
1530	1600		UK, BBC World Service	11685as	15540as
1530	1600	a	Vatican City, Vatican Radio	9865af	13765af
			15235af		

1600 UTC - 12PM EDT / 11AM CDT / 9AM PDT

1600	1615		Pakistan, Radio	9395me	11570me
			15725af	17820af	11640af
1600	1627		Iran, Voice of the Islamic Rep	7190as	9610as
1600	1627		Vietnam, Voice of	7280as	9730as
1600	1628	s	Hungary, Radio Budapest	6025eu	9585eu
1600	1630		Guam, AWR/KSDA	15495as	
1600	1630		Sri Lanka, SLBC	6005as	9770as
1600	1635		UAE, Radio Dubai	13630eu	13675eu
			17865eu	21605eu	
1600	1656		China, China Radio Intl	7190af	9570af
			13685af	15125af	
1600	1656		North Korea, Voice of	3560as	9975af
			11735af		
1600	1659	as	Canada, Radio Canada Intl	9515am	13655am
			17820am		
1600	1700		Anguilla, Caribbean Beacon	11775am	
1600	1700		Australia, HCJB	15405pa	
1600	1700		Australia, Radio	5995va	6080pa
			9475as		7240as
1600	1700		Australia, Voice Intl	13635as	
1600	1700		Canada, CBC Northern Service	9625do	
1600	1700		Canada, CFRX Toronto ON	6070do	
1600	1700		Canada, CFVP Calgary AB	6030do	
1600	1700		Canada, CKZN St John's NF	6160do	
1600	1700		Canada, CKZU Vancouver BC	6160do	
1600	1700		Costa Rica, University Network	5030am	6150am
			7375am	9725sa	11870am
			17645as		13750na
1600	1700		Ethiopia, Radio	5990af	7110af
			9560af	9704af	11800af
1600	1700	1st a	Finland, Scandinavian Weekend Radio	5990eu	
			11720eu		
1600	1700		France, Radio France Intl	9730af	11615af
			15160af	15605af	17605af
1600	1700		Germany, Bible Voice Broadcasting	6140eu	17850af
1600	1700	DRM	Germany, Deutsche Welle	6170as	9860me
1600	1700		Germany, Deutsche Welle	6170as	7225as
			11695as		
1600	1700		Jordan, Radio	11690na	
1600	1700		New Zealand, Radio NZ Intl	9870pa	
1600	1700		Russia, Voice of	4940va	4975va
			6005me	7260as	9830me
1600	1700	DRM	Russia, Voice of	9495eu	
1600	1700		South Korea, Radio Korea Intl	5975om	7255va
			9870va		
1600	1700	mtwhf	Sudan, Sudan Radio Service	15290af	15530af
1600	1700		Taiwan, Radio Taiwan Intl	11550as	
1600	1700		UK, BBC World Service	3915as	5975as
			6190af	6195as	9410eu
			11940af	12095eu	15190am
			15400af	15485eu	15310as
			17830af	21470af	15565eu
1600	1700		USA, Armed Forces Radio	4319usb	5446usb
			5765usb	6350usb	7507usb
			12133usb	12579usb	13362usb
1600	1700		USA, KTNB Salt Lake City UT	15590na	
1600	1700		USA, KWHR Naalehu HI	9930as	
1600	1700		USA, Voice of America	6110va	7125va
			9575va	9645va	9760va
			9825va	15205va	15395va
1600	1700	mtwhf	USA, WBCQ Kennebunk ME	17495na	
1600	1700		USA, WBOH Newport NC	5920am	
1600	1700		USA, WEWN Birmingham AL	9955na	
1600	1700		USA, WHRA Greenbush ME	17650af	
1600	1700		USA, WHRI Noblesville IN	9840na	15105am
1600	1700		USA, WINB Red Lion PA	9930am	
1600	1700		USA, WJIE Louisville KY	7490am	11515va
			13595am		
1600	1700	mtwhf	USA, WRMI Miami FL	15725na	
1600	1700		USA, WTJC Newport NC	9370na	
1600	1700		USA, WWCN Nashville TN	9475na	12160na
			13845na	15825na	
1600	1700	mtwhf	USA, WWRB Manchester TN	9320na	12172na
1600	1700		USA, WYFR Okeechobee FL	11830na	11865na
			15520na	17760na	17790af
			21455eu		18980eu
1600	1700		Zambia, Radio Christian Voice	4965do	
1605	1610	as	Austria, Radio Austria Intl	17865na	
1610	1625		Austria, Radio Austria Intl	17865na	

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1625	1630	as	Austria, Radio Austria Intl	17865na	
1630	1700		Egypt, Radio Cairo 9855af		
1630	1700		Georgia, Radio Georgia	6180me	
1630	1700		Guam, AWR/KSDA 11980as	15495as	
1630	1700	s	Ireland, Reflections Europe	3910eu	6295eu
			12255eu		
1630	1700		UK, BBC World Service	15420af	
1630	1700	as	UK, BBC World Service	11860af	21490af
1635	1640	as	Austria, Radio Austria Intl	17865na	
1640	1650	mtwhf	Turkmenistan, Turkmen Radio	4930as	
1640	1655		Austria, Radio Austria Intl	17865na	
1645	1700		Tajikistan, Radio 7245irr		
1655	1700	as	Austria, Radio Austria Intl	17865na	

1700 UTC - 1PM EDT / 12PM CDT / 10AM PDT

1700	1715	vl	Somalia, Radio Galkayo	6985va	9615va
1700	1727		Czech Rep, Radio Prague Intl	5930eu	17485af
1700	1727		Vietnam, Voice of 9725eu		
1700	1730		Azerbaijan, Voice of 6110eu	9155eu	
1700	1730		France, Radio France Intl	11615af	15605af
1700	1730		Jordan, Radio 11690na		
1700	1730	mtwhf	Moldova, Radio Pridnestrovy	5960eu	
1700	1745		UK, BBC World Service	6005eu	
1700	1750		New Zealand, Radio NZ Intl	9870pa	
1700	1756		China, China Radio Intl	7190af	9570af
			13685af	15125af	
1700	1800		Anguilla, Caribbean Beacon	11775am	
1700	1800		Australia, Radio 5995va	6080pa	7240as
			9475as 9710va	11880va	
1700	1800		Australia, Voice Intl 13635as		
1700	1800		Canada, CBC Northern Service	9625do	
1700	1800		Canada, CFRX Toronto ON	6070do	
1700	1800		Canada, CFVP Calgary AB	6030do	
1700	1800		Canada, CKZN St John's NF	6160do	
1700	1800		Canada, CKZU Vancouver BC	6160do	
1700	1800		Costa Rica, University Network	5030am	6150am
			7375am	9725sa	11870am 13750na
			17645as		
1700	1800		Egypt, Radio Cairo 9855af		
1700	1800		Eat Guinea, Radio Africa	7189af	15184al
1700	1800	1st a	Finland, Scandinavian Weekend Radio	5990eu	
			11720eu		
1700	1800	a w fa	Germany, Bible Voice Broadcasting	9860me	
1700	1800	as	Germany, Bible Voice Broadcasting	11650me	
1700	1800	DRM	Germany, Deutsche Welle	6140eu	
1700	1800		Germany, Overcomer Ministries	5870va	
1700	1800		Germany, Radio Africa Intl	11735af	13820af
1700	1800	a	Greece, Voice of 9420na	15630eu	17705na
1700	1800	s	Ireland, Reflections Europe	3910eu	6295eu
			12255eu		
1700	1800		Japan, Radio 9535am	11970eu	15355af
1700	1800	DRM	Russia, Voice of 9495eu		
1700	1800		Russia, Voice of 5910as	5945as	9830af
1700	1800		Swaziland, TWR	3200af	
1700	1800		Taiwan, Radio Taiwan Intl	11550as	
1700	1800		UK, BBC World Service	3255af	3915as
			5975as 6190af	6195eu	9410eu
			9510as 9630af	12095eu	15400af
			15420af	15565eu	17830af 21470af
1700	1800		USA, Armed Forces Radio	4319usb	5446usb
			5765usb	6350usb	7507usb 10320usb
			12133usb	12579usb	13362usb 13855usb
1700	1800		USA, KTNB Salt Lake City UT	15590na	
1700	1800		USA, Voice of America	6040va	6110va
			7125va	9645va	13710af
			15205va	15240af	15395va 15445af
			17895af		
1700	1800	mtwhf	USA, Voice of America	5990va	6045va
			9525va	9795va	11955va 12005va
			13600af	15255va	
1700	1800	mtwhf	USA, WBCQ Kennebunk ME	9330na	17495na
1700	1800		USA, WBOH Newport NC	5920am	
1700	1800		USA, WEWN Birmingham AL	13615na	17840af
1700	1800		USA, WHRA Greenbush ME	17650af	
1700	1800		USA, WHRI Noblesville IN	13760va	15105am
1700	1800		USA, WINB Red Lion PA	9930am	
1700	1800		USA, WJIE Louisville KY	7490am	11515va
			13595am		
1700	1800	mtwhf	USA, WMLK Bethel PA	9465eu	
1700	1800		USA, WRMI Miami FL	15725na	
1700	1800		USA, WTJC Newport NC	9370na	
1700	1800		USA, WWCR Nashville TN	9475na	12160na
			13845na	15825na	
1700	1800	smtwhf	USA, WWRB Manchester TN	9320na	12172na
1700	1800		USA, WYFR Okeechobee FL	18980eu	21455eu
			21680af		
1700	1800		Zambia, Radio Christian Voice	4965do	
1715	1730		Vatican City, Vatican Radio	4005eu	5890eu
			7250eu	9645eu	15595va
1730	1726		Romania, Radio Romania Intl	9570eu	11940eu
1730	1740	vl	Libya, Voice of Africa	15220irr	15615irr
			15660irr	17880irr	
1730	1745	mtwhf	UK, United Nations Radio	15495me	17810af
1730	1800		Guam, AWR/KSDA 11560me		
1730	1800		Liberia, ELWA	4760do	
1730	1800		Philippines, Radio Pilipinas	11730me	11890me

1730	1800		15190me		
			Slovakia, Radio Slovakia Intl	5915eu	6055eu
			7345eu		
1730	1800		Switzerland, Swiss Radio Intl	9755af	11810af
			15555 skd 1203		
1730	1800		UK, BBC World Service	3390af	5875eu
			7105eu	7230af	9530eu 9685af
1730	1800		Vatican City, Vatican Radio	13765af	15570af
			17515af		
1735	1745	vl/th	Paraguay, Radio Nacional	9739sa	
1745	1755	mtwhf	Turkmenistan, Turkmen Radio	4930as	
1745	1800		Bangladesh, Bangla Betar	7185eu	15550eu
1745	1800		India, All India Radio	7410eu	9445af
			9950eu	11620eu	11935af 13605af
			15075af	15155af	17670af
1751	1800		New Zealand, Radio NZ Intl	11980pa	

1800 UTC - 2PM EDT / 1PM CDT / 11AM PDT

1800	1810		Zanzibar, Voice of Tanzania	11734do	
1800	1815		Bangladesh, Bangla Betar	7185eu	15520eu
1800	1815	a	Germany, Bible Voice Broadcasting		13845me
1800	1815		Israel, Kol Israel 9435va	11585va	17535va
1800	1827		Czech Rep, Radio Prague Intl	5930eu	9415va
1800	1827		Vietnam, Voice of 7280eu	9725eu	9730al
1800	1830		Egypt, Radio Cairo 9855af		
1800	1830	s	Germany, Universal Life	11840af	
1800	1830		South Africa, AWR Africa	5960af	7265af
			11985af		
1800	1830		UK, BBC World Service	5975as	9510as
1800	1855		Poland, Radio Polonia	5995eu	7150eu
1800	1900		Anguilla, Caribbean Beacon	11775am	
1800	1900	mtwhf	Argentina, RAE	9690eu	15345eu
1800	1900		Australia, HCJB	11765pa	
1800	1900		Australia, Radio 6080pa	7240va	9475as
			9580va	9710pa	11880va
1800	1900		Australia, Voice Intl 11685as		
1800	1900		Canada, CBC Northern Service	9625do	
1800	1900		Canada, CFRX Toronto ON	6070do	
1800	1900		Canada, CFVP Calgary AB	6030do	
1800	1900		Canada, CKZN St John's NF	6160do	
1800	1900		Canada, CKZU Vancouver BC	6160do	
1800	1900		Costa Rica, University Network	5030am	6150am
			7375am	9725sa	11870am 13750na
			17645as		
1800	1900		Eat Guinea, Radio Africa	7189af	15184al
1800	1900	1st a	Finland, Scandinavian Weekend Radio		6170eu
			11720eu		
1800	1900		Germany, Radio Africa Intl	11735af	14820af
1800	1900		India, All India Radio	7410eu	9445af
			9950eu	11620eu	11935af 13605af
			15075af	15155af	17670af
1800	1900	s	Ireland, Reflections Europe	3910eu	6295eu
			12255eu		
1800	1900		Kuwait, Radio 11990va		
1800	1900		Latvia, Laser Radio	9290eu	
1800	1900		Liberia, ELWA	4760do	
1800	1900		Netherlands, Radio 6020af	9895af	11655af
1800	1900		New Zealand, Radio NZ Intl	11980pa	
1800	1900		Nigeria, Voice of 15120af	17800al	
1800	1900		Philippines, Radio Pilipinas	11730me	11890me
			15190me		
1800	1900		Russia, Voice of 5910as	5945as	7290eu
			9830af 11510af		
1800	1900	as	Russia, Voice of 5950eu	6175eu	
1800	1900		Sierra Leone, Radio UNAMSIL	6139af	
1800	1900		South Africa, Channel Africa	15265af	
1800	1900	as	South Africa, Radio Lusofonia	3345af	
1800	1900		Swaziland, TWR	3200af	9500af
1800	1900		Taiwan, Radio Taiwan Intl	3955eu	
1800	1900		UK, BBC World Service	3255af	6055af
			6190af 6195eu	9410eu	9630af 12095eu
			15310me	15400af	15420af 17830af
			21470af		
1800	1900		USA, Armed Forces Radio	4319usb	5446usb
			5765usb	6350usb	7507usb 10320usb
			12133usb	12579usb	13362usb 13855usb
1800	1900		USA, KTNB Salt Lake City UT	15590na	
1800	1900		USA, Voice of America	6035af	6040va
			9760va	9885va	1175af 13710af
			15240af	15580af	17895af
1800	1900	mtwhf	USA, WBCQ Kennebunk ME	9330na	17495na
1800	1900		USA, WBOH Newport NC	5920am	
1800	1900		USA, WEWN Birmingham AL	13615na	17840af
1800	1900		USA, WHRA Greenbush ME	17650af	
1800	1900		USA, WHRI Noblesville IN	9495am	13760va
1800	1900		USA, WINB Red Lion PA	9930am	
1800	1900		USA, WJIE Louisville KY	7490am	11515va
			13595am		
1800	1900	mtwhf	USA, WMLK Bethel PA	9465eu	
1800	1900		USA, WRMI Miami FL	15725na	
1800	1900		USA, WTJC Newport NC	9370na	
1800	1900		USA, WWCR Nashville TN	9475na	12160na
			13845na	15825na	
1800	1900	smtwhf	USA, WWRB Manchester TN	9320na	12172na
1800	1900		USA, WYFR Okeechobee FL	18980eu	
			21680af		
1800	1900		Zambia, Radio Christian Voice	4965do	
			Vatican City, Vatican Radio	4005eu	5890eu
			7250eu	9645eu	15595va
1800	1900		Romania, Radio Romania Intl	9570eu	11940eu
1800	1900		Libya, Voice of Africa	15220irr	15615irr
			15660irr	17880irr	
1800	1900	mtwhf	UK, United Nations Radio	15495me	17810af
1800	1900		Guam, AWR/KSDA 11560me		
1800	1900		Liberia, ELWA	4760do	
1800	1900		Philippines, Radio Pilipinas	11730me	11890me

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1800	1900		Zambia, Radio Christian Voice	4965do	
1815	1900		Bangladesh, Bangla Betar	7185eu	9550eu
			15550eu		
1820	1830	vl	Libya, Voice of Africa	11635irr	11715irr
			11860irr	17880irr	
1830	1845		Germany, IBRA Radio	9520af	
1830	1845	m w	UK, BBC World Service	6050eu	7105eu
			9685eu		
1830	1859		Belgium, Radio Vlaanderen Intl	5910va	7330eu
1830	1900		Austria, AWR Europe	11865af	
1830	1900		Bulgaria, Radio	5800eu	7500eu
1830	1900		Georgia, Radio Georgia	11910eu	
1830	1900		South Africa, AWR Africa	11985af	
1830	1900	mtwhfa	Sweden, Radio	6065va	
1845	1900		Congo, RTV Congolaise	4765af	5985af

1900 UTC - 3PM EDT / 2PM CDT / 12PM PDT

1900	1915		Congo, RTV Congolaise	4765af	5985af
1900	1915	smtwhf	Germany, Bible Voice Broadcasting	6015eu	
1900	1915	a fa	Germany, Bible Voice Broadcasting	9470me	
1900	1927		Vietnam, Voice of	7280eu	9730eu
1900	1930	s	Germany, Universal Life	7105me	
1900	1930	s	Greece, Voice of	7475eu	9420eu
			17705na		15630eu
1900	1930		Philippines, Radio Pilipinas	11730me	11890me
			15190me		
1900	1945		India, All India Radio	7410eu	9445af
			9950eu	11620eu	11935af
			15075af	15155af	17670af
			New Zealand, Radio NZ Intl	11980pa	
			China, China Radio Intl	9440af	9585af
			North Korea, Voice of	4405as	7505eu
			11335eu	11710eu	
1900	2000		Anguilla, Caribbean Beacon	11775am	
1900	2000		Australia, HCJB	11765pa	
1900	2000		Australia, Radio	6080pa	7240va
			9580va	9710pa	9500as
1900	2000		Australia, Voice Intl	11685as	
1900	2000	vl	Botswana, Radio	4820do	4830al
1900	2000		Canada, CBC Northern Service	9625do	
1900	2000		Canada, CFRX Toronto ON	6070do	
1900	2000		Canada, CFVP Calgary AB	6030do	
1900	2000		Canada, CKZN St John's NF	6160do	
1900	2000		Canada, CKZU Vancouver BC	6160do	
1900	2000		Costa Rica, University Network	5030am	6150am
			7375am	9725sa	11870am
			17645as		13750na
1900	2000		Eat Guinea, Radio Africa	7189af	15184al
1900	2000	1st a	Finland, Scandinavian Weekend Radio	5990eu	
			11690eu		
1900	2000		Germany, Deutsche Welle	6180af	11865af
			13590af	13780af	
1900	2000	vl	Ghana, Ghana BC Corp	3366do	4915do
1900	2000		Kuwait, Radio	11990va	
1900	2000		Latvia, Laser Radio	9290eu	
1900	2000		Liberia, ELWA	4760do	
1900	2000		Malaysia, RTM Radio 4	7295do	
1900	2000		Namibia, Namibian BC Corp	3270af	3290af
			6060af		
1900	2000		Netherlands, Radio	7120af	9895af
			17810af		11655af
1900	2000	as	Netherlands, Radio	15315na	17725na
1900	2000		Nigeria, Radio/Enugu	6025do	17875na
1900	2000		Nigeria, Radio/Ibadan	6050do	
1900	2000		Nigeria, Radio/Kaduna	4770do	6090do
1900	2000		Nigeria, Radio/Lagos	3326do	4990do
1900	2000		Nigeria, Voice of	15120af	17800al
1900	2000		Russia, Voice of	6175eu	7335af
			7360eu	7290eu	
1900	2000		Sierra Leone, Radio UNAMSIL	6139af	
1900	2000		Sierra Leone, SLBS	3316do	
1900	2000	vl	Solomon Islands, SIBC	5020do	9545do
1900	2000	m	South Africa, Amateur Radio League	3215af	
1900	2000		South Africa, Channel Africa	3345af	
1900	2000	m	South Africa, Radio League	3215af	
1900	2000		South Korea, Radio Korea Intl	5975om	7275eu
1900	2000	a	Sri Lanka, SLBC	6010eu	
1900	2000		Swaziland, TWR	3200af	
1900	2000		Thailand, Radio	9535eu	
1900	2000		Uganda, Radio	4976do	
1900	2000		UK, BBC World Service	5026do	7196do
			6190af	3255af	6005af
			6195eu	9630af	12095af
			15310me	17830af	
1900	2000		USA, Armed Forces Radio	4319usb	5446usb
			5765usb	6350usb	10320usb
			12133usb	12579usb	13855usb
1900	2000		USA, KALJ Dallas TX	13815va	
1900	2000		USA, KJES Vado NM	15385na	
1900	2000		USA, KTNB Salt Lake City UT	15590na	
1900	2000		USA, Voice of America	4950af	6035af
			7415af	9525va	9760va
			11870va	11975af	12015va
			13710af	15180va	15580af
			17895af		
1900	2000	s	USA, WBCQ Kennebunk ME	7415na	
1900	2000	mtwhfa	USA, WBCQ Kennebunk ME	9330na	17495na

1900	2000		USA, WBOH Newport NC	5920am	
1900	2000		USA, WERN Birmingham AL	13615na	17840af
1900	2000		USA, WHRA Greenbush ME	17650af	
1900	2000		USA, WHRI Noblesville IN	9495am	13760va
1900	2000		USA, WINB Red Lion PA	9930am	
1900	2000		USA, WJIE Louisville KY	7490am	11515va
			13595am		
1900	2000	mtwhf	USA, WMLK Bethel PA	9465eu	
1900	2000		USA, WRMI Miami FL	15725na	
1900	2000		USA, WTJC Newport NC	9370na	
1900	2000		USA, WWCN Nashville TN	9475na	12160na
			13845na	15825na	
1900	2000	smtwhf	USA, WWRB Manchester TN	9320na	12172na
1900	2000		USA, WYFR Okeechobee FL	3230af	15115af
			15565eu	18980eu	
1900	2000	vl	Vanuatu, Radio	3945al	7260do
1900	2000		Zambia, Radio Christian Voice	4965do	
1900	2000	vl	Zimbabwe, ZBC Corp	5975do	
1915	1925		Rwanda, Radio	6005do	
1915	1930	s t	Germany, Bible Voice Broadcasting		6015eu
1915	1930	s fa	Germany, Bible Voice Broadcasting		7295af
			9470me		
1915	1930		UK, BBC World Service	15105af	17885af
1923	1930	vl	Libya, Voice of Africa	15105af	15315af
1930	1945	mtwhf	Germany, Bible Voice Broadcasting		6015eu
1930	1945	a	Germany, Bible Voice Broadcasting		7295af
1930	2000		Georgia, Radio Georgia	11760eu	
1930	2000	mtwh a	Germany, AWR Europe	11845eu	
1930	2000	s fa	Germany, Bible Voice Broadcasting		9470me
1930	2000		Greece, Voice of	5865eu	
1930	2000	s	Greece, Voice of	7475eu	9420eu
			17705na		15630eu
1930	2000		Iran, Voice of the Islamic Rep	11695eu	15140eu
1930	2000		Papua New Guinea, NBC	4890do	9675irr
1930	2000		Serbia & Montenegro, Intl Radio	6100eu	
1930	2000		Slovakia, Radio Slovakia Intl	5915eu	6055eu
			7345eu		
1930	2000		Switzerland, Swiss Radio Intl	9820va	11920va
			13660va	17660va	
1930	2000		Turkey, Voice of	6055eu	
1935	1955		Italy, RAI Intl	5965eu	9755eu
1945	2000	mtwhfa	Albania, Radio Tirana Intl	7210eu	9510eu
1945	2000	a	Germany, Bible Voice Broadcasting		6015eu
			7295af		
1951	2000		New Zealand, Radio NZ Intl	15265pa	

2000 UTC - 4PM EDT / 3PM CDT / 1PM PDT

2000	2015	as	Germany, Bible Voice Broadcasting		9470me
2000	2020		Turkey, Voice of	6055eu	
2000	2028		Hungary, Radio Budapest	3975eu	6025eu
2000	2030	s	Germany, Bible Voice Broadcasting		6015eu
2000	2030		Iran, Voice of the Islamic Rep	6110eu	7320eu
2000	2030		Israel, Kol Israel	6280va	11585va
2000	2030		Mongolia, Voice of	9720as	15640va
2000	2030		Switzerland, Swiss Radio Intl	9820af	11920af
			13660af	17660af	
2000	2030		Vatican City, Vatican Radio	7365af	9660af
			11625af		
2000	2045		Swaziland, TWR	3200af	
2000	2045	mtwhfa	USA, WBCQ Kennebunk ME	9330na	17495na
2000	2045	s	USA, WBCQ Kennebunk ME	7415na	
2000	2055		Netherlands, Radio	7120af	9895af
			17810af		11655af
2000	2055	as	Netherlands, Radio	15315na	17725na
2000	2056		China, China Radio Intl	5965eu	9440af
			9840eu	11640af	13630af
2000	2059	mtwhf	Spain, Radio Exterior Espana	9595af	9680eu
2000	2100		Anguilla, Caribbean Beacon	11775am	
2000	2100		Australia, ABC NT Alice Springs	2310do	4835irr
2000	2100		Australia, ABC NT Katherine	2485do	
2000	2100		Australia, ABC NT Tennant Creek	2325do	
2000	2100		Australia, Radio	9500as	9580va
			11880va	12080va	
2000	2100	as	Australia, Radio	6080pa	
2000	2100		Australia, Voice Intl	11685as	
2000	2100	vl	Botswana, Radio	4820do	4830al
2000	2100		Canada, CBC Northern Service	9625do	
2000	2100		Canada, CFRX Toronto ON	6070do	
2000	2100		Canada, CFVP Calgary AB	6030do	
2000	2100		Canada, CKZN St John's NF	6160do	
2000	2100		Canada, CKZU Vancouver BC	6160do	
2000	2100		Costa Rica, University Network	5030am	6150am
			7375am	9725sa	11870am
			17645as		13750na
2000	2100		Eat Guinea, Radio Africa	7189af	15184al
2000	2100	1st a	Finland, Scandinavian Weekend Radio	5990eu	
			11690eu		
2000	2100		Germany, Deutsche Welle	13590af	13780af
			15205af	15410af	
2000	2100		Germany, Overcomer Ministries	9755af	
2000	2100	vl	Ghana, Ghana BC Corp	3366do	4915do
2000	2100		Indonesia, Voice of	15150eu	
2000	2100	s	Ireland, Reflections Europe	3910eu	6295eu
			12255eu		
2000	2100	vl	Italy, IRRS	5775va	
2000	2100		Kuwait, Radio	11990va	

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2000	2100	Latvia, Laser Radio	9290eu		2100	2200	Anguilla, Caribbean Beacon	11775am	
2000	2100	Liberia, ELWA	4760do		2100	2200	Australia, ABC NT Alice Springs	2310do	4835irr
2000	2100	Malaysia, RTM Radio 4	7295do		2100	2200	Australia, Radio	9500as	9660pa
2000	2100	Namibia, Namibian BC Corp	3270af	3290af			11880va	12080va	13630va
		6060af					Australia, Voice Intl	9795as	
2000	2100	New Zealand, Radio NZ Intl	15265pa		2100	2200	Austria, AWR Europe	9660af	
2000	2100	Nigeria, Radio/Enugu	6025do		2100	2200	Botswana, Radio	4820do	4830al
2000	2100	Nigeria, Radio/Ibadan	6050do		2100	2200	Canada, CBC Northern Service	9625do	
2000	2100	Nigeria, Radio/Kaduna	4770do	6090do	2100	2200	Canada, CFRX Toronto ON	6070do	
2000	2100	Nigeria, Radio/Lagos	3326do	4990do	2100	2200	Canada, CFVP Calgary AB	6030do	
2000	2100	Nigeria, Voice of	17800af		2100	2200	Canada, CKZN St John's NF	6160do	
2000	2100	Papua New Guinea, NBC	4890do	9675irr	2100	2200	Canada, CKZU Vancouver BC	6160do	
2000	2100	Russia, Voice of	6145eu	7290eu	2100	2200	Costa Rica, University Network	5030am	6150am
		7360eu					7375am	9725sa	11870am
2000	2100	Sierra Leone, Radio UNAMSIL	6139af				17645as		
2000	2100	Sierra Leone, SLBS	3316do		2100	2200	Eat Guinea, Radio Africa	7189af	15184al
2000	2100	Solomon Islands, SIBC	5020do	9545do	2100	2200	Finland, Scandinavian Weekend	Radio	5990eu
2000	2100	South Africa, AWR Africa	15295af				11720eu		
2000	2100	South Africa, Channel Africa	3345af		2100	2200	Germany, Deutsche Welle	9615af	13780af
2000	2100	Syria, Radio Damascus	12085eu	13610eu			15410af		
2000	2100	Uganda, Radio	4976do	7196do	2100	2200	Ghana, Ghana BC Corp	3366do	4915do
2000	2100	UK, BBC World Service	3255af	6005af	2100	2200	Guyana, Voice of	5949do	
		6190af 6195eu	9410eu	12095af	2100	2200	India, All India Radio	7410eu	9445eu
		15400af	17830af				9575au	9910au	9950eu
2000	2100	USA, Armed Forces Radio	4319usb	5446usb	2100	2200	11715au		11620va
		6350usb	7507usb	12133usb			Ireland, Reflections Europe	3910eu	6295eu
		12579usb	13362usb				12255eu		
2000	2100	USA, KAIJ Dallas TX	13815va		2100	2200	Japan, Radio	6090eu	6180eu
2000	2100	USA, KTNB Salt Lake City UT	15590na				11920va	17825na	21670as
2000	2100	USA, Voice of America	4950af	6035af	2100	2200	Latvia, Laser Radio	9290eu	
		6095va	7415af	7415af	2100	2200	Liberia, ELWA	4760do	
		9690va	9760va	11975af	2100	2200	Malaysia, RTM Radio 4	7295do	
		13710af	15240af	15580af	2100	2200	Namibia, Namibian BC Corp	3270af	3290af
		17895af					6060af		
2000	2100	USA, WBOH Newport NC	5920am		2100	2200	New Zealand, Radio NZ Intl	15265pa	
2000	2100	USA, WEWN Birmingham AL	13615na	17595af	2100	2200	Nigeria, Radio/Enugu	6025do	
2000	2100	USA, WHRA Greenbush ME	17650as		2100	2200	Nigeria, Radio/Ibadan	6050do	
2000	2100	USA, WHRI Noblesville IN	5745va	9495am	2100	2200	Nigeria, Radio/Kaduna	4770do	6090do
2000	2100	USA, WINB Red Lion PA	9930am		2100	2200	Nigeria, Radio/Lagos	3326do	4990do
2000	2100	USA, WJIE Louisville KY	7490am	11515va	2100	2200	Nigeria, Voice of	17800af	
		13595am			2100	2200	Papua New Guinea, NBC	4890do	9675irr
2000	2100	USA, WMLK Bethel PA	9465eu		2100	2200	Russia, Voice of	6235eu	7290eu
2000	2100	USA, WRMI Miami FL	15725na		2100	2200	Sierra Leone, Radio UNAMSIL	6139af	7360eu
2000	2100	USA, WTJC Newport NC	9370na		2100	2200	Sierra Leone, SLBS	3316do	
2000	2100	USA, WWCR Nashville TN	9475na	12160na	2100	2200	South Africa, Channel Africa	3345af	
		13845na	15825na		2100	2200	Syria, Radio Damascus	12085eu	13610eu
2000	2100	USA, WWRB Manchester TN	9320na	12172na	2100	2200	UK, BBC World Service	3255af	3915as
2000	2100	USA, WYFR Okeechobee FL	3230af	5810eu			5965as 5975ca	6005af	6110as
		7580eu	15195sa	15565sa			6195va	9410eu	9605af
2000	2100	Vanuatu, Radio	3945al	7260do			15400af		12095sa
2000	2100	Zambia, Radio Christian Voice	4965do		2100	2200	USA, Armed Forces Radio	4319usb	5446usb
2000	2100	Zimbabwe, ZBC Corp	5975do				5765usb	6350usb	7507usb
2025	2045	Italy, RAI Intl	5985af	11880af			12133usb	12579usb	13362usb
2030	2045	Thailand, Radio	9535eu		2100	2200	USA, KAIJ Dallas TX	13815va	
2030	2056	Romania, Radio Romania Intl	6110eu	7105eu	2100	2200	USA, KTNB Salt Lake City UT	15590na	
2030	2057	Vietnam, Voice of	7280eu		2100	2200	USA, Voice of America	6035af	6040va
2030	2059	Belgium, Radio Vlaanderen Intl	7330eu				6095va	7415af	9595va
2030	2100	Belarus, Radio Belarus Intl	7105eu	7210eu			9760va	11870va	11975af
2030	2100	Cuba, Radio Havana	9505eu	11760eu			15185va	15240af	15580af
2030	2100	Egypt, Radio Cairo	15375af		2100	2200	17820va	17895af	
2030	2100	Sweden, Radio	6065va	9400va	2100	2200	USA, WBCQ Kennebunk ME	7415na	17495na
2030	2100	USA, Voice of America	4950af		2100	2200	USA, WBOH Newport NC	5920am	
2030	2100	Uzbekistan, Radio Tashkent Intl	5025eu	7185eu	2100	2200	USA, WEWN Birmingham AL	13615na	17595af
		11905eu			2100	2200	USA, WHRA Greenbush ME	17650af	
2040	2100	Armenia, Voice of	4810eu	9960eu	2100	2200	USA, WHRI Noblesville IN	5745va	9495am
2045	2100	India, All India Radio	7410eu	9445eu	2100	2200	USA, WINB Red Lion PA	9930am	
		9575au	9910au	9950eu	2100	2200	USA, WJIE Louisville KY	7490am	11515va
		11715au					13595am		
2045	2100	USA, WBCQ Kennebunk ME	7415na		2100	2200	USA, WRMI Miami FL	15725na	
2045	2100	USA, WBCQ Kennebunk ME	5105na	9330na	2100	2200	USA, WTJC Newport NC	9370na	
		17495na			2100	2200	USA, WWCR Nashville TN	7465na	9475na
2050	2100	Vatican City, Vatican Radio	4005eu	5890eu			12160na	13845na	
		7250eu			2100	2200	USA, WWRB Manchester TN	9320na	12172na
2055	2100	Vatican City, Vatican Radio	9800eu		2100	2200	USA, WYFR Okeechobee FL	5810eu	7580eu
							11740na	15565af	
					2100	2200	Vanuatu, Radio	3945al	7260do
					2100	2200	Zambia, Radio Christian Voice	4965do	
					2100	2200	Zimbabwe, ZBC Corp	5975do	
					2115	2130	UK, BBC World Service	5975ca	11675ca
							15390ca		
2100	2110	Vatican City, Vatican Radio	4005eu	5890eu	2115	2200	Egypt, Radio Cairo	9989eu	15375af
		7250eu			2123	2130	Libya, Voice of Africa	15105af	15315af
2100	2115	Egypt, Radio Cairo	15375af		2130	2156	China, China Radio Intl	5965eu	9840eu
2100	2115	UK, BBC World Service	5975ca		2130	2200	Australia, ABC NT Katherine	5025do	
2100	2127	Czech Rep, Radio Prague Intl	5930eu	9430va	2130	2200	Australia, ABC NT Tennant Creek	4910do	
2100	2130	Australia, ABC NT Katherine	2485do		2130	2200	Belarus, Radio Belarus Intl	7105eu	7210eu
2100	2130	Australia, ABC NT Tennant Creek	2325do		2130	2200	Guam, AWR/KSDA	11980as	
2100	2130	China, China Radio Intl	5965eu	9840eu	2130	2200	Italy, IRRS	5775va	
		11640af	13630af		2130	2200	Netherlands, Radio	9800na	
2100	2130	Cuba, Radio Havana	9505na	11760eu	2130	2200	Turkey, Voice of	9525as	
2100	2130	Italy, IRRS	5775va		2130	2200	UK, Wales Radio Intl	7110eu	
2100	2130	Nigeria, Radio Jakada Intl	7380af		2130	2200	USA, WBCQ Kennebunk ME	5105na	9330na
2100	2130	USA, WBCQ Kennebunk ME	5105na	9330na			17495na		
		17495na			2130	2200	Uzbekistan, Radio Tashkent Intl	5025eu	7185eu
2100	2130	Vatican City, Vatican Radio	9800eu				11905eu		
2100	2155	Netherlands, Radio	11730eu						
2100	2156	North Korea, Voice of	4405as	7505eu					
		11335eu							
2100	2159	Canada, Radio Canada Intl	5850va	7235va					
		7425va	9770va	9805va					
				13650va					

2100 UTC - 5PM EDT / 4PM CDT / 2PM PDT

Shortwave Guide



2200 UTC - 6PM EDT / 5PM CDT / 3PM PDT

2200	2220		Turkey, Voice of	9525as		
2200	2228		Hungary, Radio Budapest	6025eu	11965af	
2200	2229		Belgium, Radio Vlaanderen Intl	11730na		
2200	2230		Canada, Radio Canada Intl	5850va	6045va	
			9770va	12005va		
2200	2230		India, All India Radio	7410eu	9445eu	
			9575au	9910au	9950eu	11620va
			11715au			
2200	2230	s	Ireland, Reflections Europe	3910eu	6295eu	
			12255eu			
2200	2230	twfhas/vl	Italy, IRRS	5775va		
2200	2230		Liberia, ELWA	4760do		
2200	2230		Serbia & Montenegro, Intl Radio	6100eu		
2200	2230		South Korea, Radio Korea Intl	3955eu		
2200	2230	mtwhf	USA, Voice of America	6035af	7415af	
			11655af	11975af	13710af	
2200	2240		New Zealand, Radio NZ Intl	15265pa		
2200	2245		Egypt, Radio Cairo	9989eu		
2200	2256		China, China Radio Intl	7170eu		
2200	2256		Romania, Radio Romania Intl	5975eu	7250eu	
			9550na	11830na		
2200	2300		Anguilla, Caribbean Beacon	6090am		
2200	2300		Australia, ABC NT Alice Springs	2310do	4835irr	
2200	2300		Australia, ABC NT Katherine	5025do		
2200	2300		Australia, ABC NT Tennant Creek	4910do		
2200	2300		Australia, Radio	9660pa	11695as	12080va
			13620as	13630as	15230as	17750as
			17795va	21740va		
2300	0000		Australia, Voice Intl	13620as		
2300	0000	vl	Botswana, Radio	4820do	4830al	
2300	0000		Canada, CBC Northern Service	9625do		
2300	0000		Canada, CFRX Toronto ON	6070do		
2300	0000		Canada, CFVP Calgary AB	6030do		
2300	0000		Canada, CKZN St John's NF	6160do		
2300	0000		Canada, CKZU Vancouver BC	6160do		
2300	0000	DRM	Canada, Radio Canada Intl	9800eu		
2300	0000		Costa Rica, University Network	5030am	6150am	
			7375am	9725sa	11870am	13750na
			17645as			
2300	0000		Cuba, Radio Havana	9550am		
2300	0000		Egypt, Radio Cairo	11725na		
2300	0000	1st f	Finland, Scandinavian Weekend	Radio	5980eu	
			11690eu			
2300	0000		Germany, Deutsche Welle	7250as	9815as	
			12035as			
2300	0000	DRM	Germany, Deutsche Welle	9800as		
2300	0000	vl	Ghana, Ghana BC Corp	3366do	4915do	
2300	0000		Guyana, Voice of	3291do	5949do	
2300	0000		India, All India Radio	9705as	9950as	
			11620as	13605as		
2300	0000		Malaysia, RTM Radio 4	7295do		
2300	0000		Namibia, Namibian BC Corp	6060af	3290af	
2300	0000		New Zealand, Radio NZ Intl	17675pa		
2300	0000		Papua New Guinea, NBC	4890do	9675irr	
2300	0000		Sierra Leone, Radio UNAMSIL	6139af		
2300	0000		Sierra Leone, SLBS	3316do		
2300	0000		Singapore, Mediakor Radio	6150do		
2300	0000	vl	Solomon Islands, SIBC	5020do	9545do	
2300	0000		UK, BBC World Service	3915as	5965as	
			6035as	6195va	9740as	11945as
			12095sa	15280as		
2300	0000		USA, Armed Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7507usb	10320usb
			12133usb	12579usb	13362usb	13855usb
2300	0000		USA, KALJ Dallas TX	13815va		
2300	0000		USA, KTNB Salt Lake City UT	15590na		
2300	0000		USA, KWHR Naalehu HI	17510as		
2300	0000		USA, WBCQ Kennebunk ME	5105na	7415na	
			9330na			
2300	0000		USA, WBOH Newport NC	5920am		
2300	0000		USA, WEWN Birmingham AL	9975na	17595af	
2300	0000		USA, WHRA Greenbush ME	7580va		
2300	0000		USA, WHRI Noblesville IN	5745va	9495am	
2300	0000		USA, WINB Red Lion PA	9320am		
2300	0000		USA, WJIE Louisville KY	7490am	11515va	
			13595am			
2300	0000		USA, WRMI Miami FL	15725na		
2300	0000	mtwhf	USA, WRMI Miami FL	15725na		
2300	0000		USA, WTJC Newport NC	9370na		
2300	0000	as	USA, WWBS Macon GA	11910na		
2300	0000		USA, WWCR Nashville TN	3210na	5070na	
			7465na	13845na		
2300	0000		USA, WWRB Manchester TN	5050na	5085na	
			6890na			
2300	0000		USA, WYFR Okeechobee FL	5985sa	11740na	
			11855sa	15170sa	15400sa	
2300	0000		USA, WYFR Okeechobee FL	5985ca	11855ca	
			15170af			
2300	0000	vl	Vanuatu, Radio	3945al	7260do	
2300	0000		Zambia, Radio Christian Voice	4965do		
2300	2329		Canada, Radio Canada Intl	5960am	9590am	
			11865am			
2300	2330		USA, Voice of America	6180va	7205va	
			9780va	11655va	15150va	
2300	2330	w	USA, WBCQ Kennebunk ME	17495na		
2300	2350		Turkey, Voice of	6015va	9655va	
2300	2356		China, China Radio Intl	5990ca	6040na	
			13680na			
2300	2356		Romania, Radio Romania Intl	11840au	11940au	
			15145au	15370au		
2304	0000		USA, WYFR Okeechobee FL	15400sa		
2315	2330		Croatia, Voice of	7285sa		
2330	0000		Canada, Radio Canada Intl	5960na	9590na	
2330	0000		Lithuania, Radio Vilnius	9875na		
2330	0000		Switzerland, Swiss Radio Intl	9885sa	11660sa	
2330	0000		USA, Voice of America	6180va	7130va	
			7205va	9620va	9780va	11735va
			11805va	13640va	15110va	15205va
2330	2357		Czech Rep, Radio Prague Intl	5915na	7345na	
2330	2357		Vietnam, Voice of	9840as	12020as	
2330	2359	DRM	Sweden, Radio	9800na		

2300 UTC - 7PM EDT / 6PM CDT / 4PM PDT

2300	0000		Anguilla, Caribbean Beacon	6090am		
2300	0000		Australia, ABC NT Alice Springs	2310do	4835irr	
2300	0000		Australia, ABC NT Katherine	5025do		
2300	0000		Australia, ABC NT Tennant Creek	4910do		
2300	0000		Australia, Radio	9660pa	11695as	12080va
			13620as	13630as	15230as	17750as
			17795va	21740va		
2300	0000		Australia, Voice Intl	13620as		
2300	0000	vl	Botswana, Radio	4820do	4830al	
2300	0000		Canada, CBC Northern Service	9625do		
2300	0000		Canada, CFRX Toronto ON	6070do		
2300	0000		Canada, CFVP Calgary AB	6030do		
2300	0000		Canada, CKZN St John's NF	6160do		
2300	0000		Canada, CKZU Vancouver BC	6160do		
2300	0000		Costa Rica, University Network	5030am	6150am	
			7375am	9725sa	11870am	13750na
			17645as			
2300	0000		Cuba, Radio Havana	9550am		
2300	0000		Egypt, Radio Cairo	11725na		
2300	0000	1st f	Finland, Scandinavian Weekend	Radio	5980eu	
			11690eu			
2300	0000		Germany, Deutsche Welle	7250as	9815as	
			12035as			
2300	0000	DRM	Germany, Deutsche Welle	9800as		
2300	0000	vl	Ghana, Ghana BC Corp	3366do	4915do	
2300	0000		Guyana, Voice of	3291do	5949do	
2300	0000		India, All India Radio	9705as	9950as	
			11620as	13605as		
2300	0000		Malaysia, RTM Radio 4	7295do		
2300	0000		Namibia, Namibian BC Corp	6060af	3290af	
2300	0000		New Zealand, Radio NZ Intl	17675pa		
2300	0000		Papua New Guinea, NBC	4890do	9675irr	
2300	0000		Sierra Leone, Radio UNAMSIL	6139af		
2300	0000		Sierra Leone, SLBS	3316do		
2300	0000		Singapore, Mediakor Radio	6150do		
2300	0000	vl	Solomon Islands, SIBC	5020do	9545do	
2300	0000		UK, BBC World Service	3915as	5965as	
			6035as	6195va	9740as	11945as
			12095sa	15280as		
2300	0000		USA, Armed Forces Radio	4319usb	5446usb	
			5765usb	6350usb	7507usb	10320usb
			12133usb	12579usb	13362usb	13855usb
2300	0000		USA, KALJ Dallas TX	13815va		
2300	0000		USA, KTNB Salt Lake City UT	15590na		
2300	0000		USA, KWHR Naalehu HI	17510as		
2300	0000		USA, WBCQ Kennebunk ME	5105na	7415na	
			9330na			
2300	0000		USA, WBOH Newport NC	5920am		
2300	0000		USA, WEWN Birmingham AL	9975na	17595af	
2300	0000		USA, WHRA Greenbush ME	7580va		
2300	0000		USA, WHRI Noblesville IN	5745va	9495am	
2300	0000		USA, WINB Red Lion PA	9320am		
2300	0000		USA, WJIE Louisville KY	7490am	11515va	
			13595am			
2300	0000		USA, WRMI Miami FL	15725na		
2300	0000	mtwhf	USA, WRMI Miami FL	15725na		
2300	0000		USA, WTJC Newport NC	9370na		
2300	0000	as	USA, WWBS Macon GA	11910na		
2300	0000		USA, WWCR Nashville TN	3210na	5070na	
			7465na	13845na		
2300	0000		USA, WWRB Manchester TN	5050na	5085na	
			6890na			
2300	0000		USA, WYFR Okeechobee FL	5985sa	11740na	
			11855sa	15170sa	15400sa	
2300	0000		USA, WYFR Okeechobee FL	5985ca	11855ca	
			15170af			
2300	0000	vl	Vanuatu, Radio	3945al	7260do	
2300	0000		Zambia, Radio Christian Voice	4965do		
2300	2329		Canada, Radio Canada Intl	5960am	9590am	
			11865am			
2300	2330		USA, Voice of America	6180va	7205va	
			9780va	11655va	15150va	
2300	2330	w	USA, WBCQ Kennebunk ME	17495na		
2300	2350		Turkey, Voice of	6015va	9655va	
2300	2356		China, China Radio Intl	5990ca	6040na	
			13680na			
2300	2356		Romania, Radio Romania Intl	11840au	11940au	
			15145au	15370au		
2304	0000		USA, WYFR Okeechobee FL	15400sa		
2315	2330		Croatia, Voice of	7285sa		
2330	0000		Canada, Radio Canada Intl	5960na	9590na	
2330	0000		Lithuania, Radio Vilnius	9875na		
2330	0000		Switzerland, Swiss Radio Intl	9885sa	11660sa	
2330	0000		USA, Voice of America	6180va	7130va	
			7205va	9620va	9780va	11735va
			11805va	13640va	15110va	15205va
2330	2357		Czech Rep, Radio Prague Intl	5915na	7345na	
2330	2357		Vietnam, Voice of	9840as	12020as	
2330	2359	DRM	Sweden, Radio	9800na		



Headnotes:

1. Reception of the **Deutsche Welle** 2100 broadcast has been consistently reliable, so we list the programs available at this time for North America listeners. Consult the frequency section of the SWG for where to tune.
2. **Listings for US-based independent shortwave broadcasters are limited to general interest programming** that departs from their largely primary formats of religious and political fare. Please be aware that the schedules of these stations can be quite fluid and are highly subject to change with little or no advance notice.
3. **BBCWS stream abbreviations:** (am)=Americas; (eas)=East Asia. These are the streams recommended by Bush House for North American listeners and both are included in the program schedules when identified by the BBC as potentially receivable on shortwave in North America.
4. Just a reminder, if you were expecting a different layout this month, we've decided to start each new season (April begins A04) with the "by hour, by station" format.

0000 UTC/ 8pm EDT/5pm PDT - Page 45 Freqs

BBC WORLD SERVICE (am)

0000 D News; 0006 S Top of the Pops (British music charts), M Everywoman, T/H Documentaries, W Masterpiece (artistic ideas), F Assignment, A Sports International; 0032 M Westway Omnibus, T Music Feature, W White Label (new music), H Charlie Gillett (world music), F Music Biz, A John Peel (eclectic).

RADIO AUSTRALIA

0000 D News; 0005 S Keys to Music (enjoying the classics), A Business Report; 0010 M AWAYE! (Aboriginal culture), T The Science Show, W The National Interest (Australian politics), H Background Briefing (documentary), F Hindsight (Australian history); 0030 A Ockham's Razor (science opinion); 0045 A Lingua Franca (about language).

RADIO EXTERIOR ESPANA

0000 S Visitors Book (travelers to Spain), M Window on Spain (culture), T-A News (international, Spain, Latin America); 0015 S/M Spanish history or culture series; 0025 S/M Rebroadcast of 0035 weekday programs, T-A Spanish pop music; 0030 T-A Press Review; 0035 S/T Radio Waves, W Chronicles (Spain & the US), H Entremeses (food & travel), F Africa Today, A Radio Club (letters); 0045 T-A A Language Without Bounds (Spanish lesson).

RADIO JAPAN - NHK WORLD

0000 D News; 0010 S Hello from Tokyo (listener contact), M Weekend Japanology, T-A Songs for Everyone; 0015 T-A 44 Minutes (magazine); 0054 M Japan: Take 5.

RADIO NETHERLANDS

0000 S/M News; T-A Newline; 0005 S Wide Angle (in-depth), M Europe Unzipped; 0025 S The Week Ahead (on RN), M Insight (commentary); 0030 S Amsterdam Forum (conversations), M Vox Humana (culture), T Research File (science), W EuroQuest (Europe in context), H Documentary, F Dutch Horizons, A A Good Life (development).

RADIO NEW ZEALAND INTERNATIONAL

0000 S-H Midday Report, F/S News; 0012 F Focus on Politics, A This Week in Parliament; 0033 F The Sampler (latest CDs), A Spectrum (life in NZ).

RADIO PRAGUE

0000 D News; 0005 S Magazine, M Mailbox, T-A Current Affairs; 0010 S Letter from Prague, M ABC of Czech (the language), W Czech Science, H Witness (eyewitness to history), A The Arts; 0015 S/W One on One (interview), M Encore [or] Magic Carpet (both monthly) [or] Czech Books (biweekly), T Talking Point (Czech issues), H Czechs in History [or] Czechs Today (both monthly) [or] Spotlight (travelogue), F Economic Report, A Stepping Out (Prague nightlife).

VOICE OF AMERICA (News Now)

0000 T-A News and Reports; 0023 T-A Sports; 0030 T-A News Headlines; 0033 T-A Coast to Coast (American life).

WBCQ, Maine

5105 kHz.: 0000 M Firesign Theatre Hour (classic satire)
7415 kHz.: 0000 S Different Kind of Oldies Show, M Radio New York International, A Allan Weiner Worldwide.
9330 kHz.: 0030 S World of Radio.

WHRA, Maine

7580 kHz. 0005 T-A For the People (continued).

WHRI, Indiana

7315 kHz.: 0030 S DXing with Cumbre.

0100 UTC/ 9pm EDT/6pm PDT - Page 45 Freqs

BBC WORLD SERVICE (am)

0100 D News; 0106 S Play of the Week (radio theatre), M The Ticket (global arts survey), T Health Matters, W Go Digital, H Discovery (science), F One Planet (ecology), A Science in Action; 0132 T Quiz or panel game, W Music Review, H/A Westway, F The Word (writing & writers) [exc. 27th, World Book Club (discussion)]; 0145 H Heart & Soul (beliefs & values), A What's the Problem (advice).

CHINA RADIO INTERNATIONAL

0100 D News & Reports; 0110 S Report on Developing Countries; 0115 A Cutting Edge (sci/tech); 0120 S CRI Roundup; 0130 S In the Spotlight (cultural magazine), M People in the Know (China's leading personalities), T Biz China, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China, A Listeners' Garden.

RADIO AUSTRALIA

0100 D News; 0105 S Correspondents' Report, A Asia Pacific (regional current affairs); 0110 M-F Asia Pacific; 0130 S In Conversation (about science), M Health Report, T Law Report, W Religion Report, H Media Report, F The Sports Factor, A The Chat Room (interviews).

RADIO AUSTRIA INTERNATIONAL

0105 S/M Insight Central Europe; 0115 T-A Report from Austria; 0125 S/M Listener Letters; 0135 S/M Insight Central Europe; 0145 T-A Report from Austria; 0155 S/M Listener Letters.

RADIO BUDAPEST

0100 D News; 0105 S Insight Central Europe; M Europe Unlimited (trade) or Heading for Hungary (travel) or Spotlight (culture) or And the Gatepost (letters), T-A Hungary Today (current events magazine); 0120 A DX Corner.

RADIO CANADA INTERNATIONAL

0100 D News; 0105 S Business Sense, M Maple Leaf Mailbag (w/CIDX report bimonthly); 0110 T-A Canada Today (current events magazine); 0135 S/A Sci-Tech File, M/H Spotlight (arts & culture), T Media Zone (journalists discuss), W Maple Leaf Mailbag (w/CIDX report bimonthly), F Business Sense.

RADIO HABANA CUBA

0100 D International News; 0110 M Weekly Review, T-S National News; 0115 T-S Viewpoint; 0130 M Reports & Music, T-S News Bulletin; 0135 T-A Time Out (sports); 0140 S/W DXers Unlimited, M Mailbag Show, T/H/F Caribbean Outlook, A Weekly Review; 0150 M Breakthrough (science report).

RADIO NETHERLANDS

0100 S/M News; T-A Newline; 0105 S Wide Angle

(in-depth), M Europe Unzipped; 0125 S The Week Ahead (on RN), M Insight (commentary); 0130 S Amsterdam Forum (conversations), M Vox Humana (culture), T Research File (science), W EuroQuest (Europe in context), H Documentary, F Dutch Horizons, A A Good Life (development).

RADIO NEW ZEALAND INTERNATIONAL

0100 S/A RNZ News, M-F Pacific Regional News; 0106 S At the Movies, M-F Wayne's Music (favorites), A Digital Life; 0130 S Bookmarks, A Saturday Comedy Zone.

RADIO PRAGUE

0100 D News; 0105 S Magazine, M Mailbox, T-A Current Affairs; 0110 S Letter from Prague, M ABC of Czech (the language), W Czech Science, H Witness (eyewitness to history), A The Arts; 0115 S/W One on One (interview), M Encore [or] Magic Carpet (both monthly) [or] Czech Books (biweekly), T Talking Point (Czech issues), H Czechs in History [or] Czechs Today (both monthly) [or] Spotlight (travelogue), F Economic Report, A Stepping Out (Prague nightlife).

RADIO SLOVAKIA INTERNATIONAL

0100 D News; 0105 S Front Page Review (Slovak press), M Weekly Newsreel T-A Topical Issue; 0110 S Various features, M Listeners' Tribune (letters, magazine, Slovak music), T Insight Central Europe, W Tourism News or Environmental Update, H Business News, F Culture News or Back Page News (the offbeat), A Education, Science and Regional News.

VOICE OF AMERICA (News Now)

0100 T-A News and Reports; 0115 Focus (one news story in depth); 0123 T-A Sports; 0130 T-A News Headlines; 0133 T-F Business Report, A Our World (science magazine); 0145 T-F Dateline (daily short documentary); 0155 T-F Opinion Roundup.

VOICE OF RUSSIA

0100 D News; 0111 S/M Moscow Mailbag, T-A Commonwealth Update; 0130 D News in Brief; 0132 S Moscow Yesterday & Today, M Timelines, T Folk Box, W Jazz Show, H Musical Portraits, F Moscow Calling, A Christian Message from Moscow; 0146 F Music At Your Request; 0154 H Russia: People & Events.

VOICE OF VIETNAM

0100 D News; 0105 D Current Affairs; 0110 S Weekly Review, M Sunday Show, T/W/F/A Press Review, H Talk of the Week; 0115 T Vietnam: Land & People, W Culture & Society, H Letterbox, F Vietnam Economy, A Rural Vietnam; 0120 S Music, A Literature and Arts.

RADIO SWEDEN

0130 S Network Europe (Europe magazine-1st week)/Sweden Today (2nd)/Spectrum (arts magazine-3rd)/Studio 49 (topical discussion-4th), M In Touch with Stockholm (listener contact-1st)/Sounds Nordic (rock music-exc. 1st), T-A Sixty Degrees North (regional report); 0145 T Sports Scan, W Close Up (profiles of Swedes-1st), F Nordic Lights (1st)/Green Scan (ecology-2nd)/Heart Beat (health-3rd)/The S-Files (things Swedish-4th), A Review of the Newsweek.

VOICE OF AMERICA (Special English)

0130 T-A News; 0140 T Agriculture Today, W/H Science Report, F Environment Report, A In the News; 0145 T Science in the News, W Explorations, H Making of a Nation, F American Mosaic; A American Stories.

WBCQ, Maine

5105 kHz.: 0100 M Tesla's Ear.
7415 kHz.: 0100 S Marion's Attic (vintage recordings), M Radio New York International (cont'd), T The Secular Bible Study, A Tasha Takes Control.
9330 kHz.: 0100 M Odin Lives (old Norse legends/music)

Shortwave Guide



WHRA, Maine

7580 kHz.: **0105** S Turn Your Radio On (southern gospel music).

WHRI, Indiana

7315 kHz.: **0105** S Turn Your Radio On (southern gospel music).

0200 UTC/ 10pm EDT/7pm PDT - Page 46 Freqs

BBC WORLD SERVICE (am)

0200 S/A News, M-F The World Today; **0232** S The Interview (trends), M World Business Review, T-A World Business Report; **0245** M Instant Guide (background), T/W/F/A Analysis, H From Our Own Correspondent.

RADIO AUSTRALIA

0200 D News; **0205** S Margaret Throsby (interviews and music), A Background Briefing (documentary); **0210** M-F The World Today (ABC Radio flagship news program); **0255** T-F Stock Market Report, A Reporter's Notebook.

[Special service: **0205** S/A Grandstand (live sports action) on 9660, 12080, 17580, 21725 kHz. only.]

RADIO BULGARIA

0200 D News; **0210** S Views Behind the News, M Folk Studio (Bulgarian folk music), T-A Events and Developments; **0220** T Sports; **0225** W-S Timeout for Music; **0230** T Bulgarian Plaza (cultural magazine) or Walks and Talks (interesting places); **0235** T Answering Your Letters, W-M Keyword Bulgaria (Bulgaria and things Bulgarian); **0245** S Radio Bulgaria Calling (for radio hobbyists), W Magazine Economy, H Arts and Artists, F History Club, A The Way We Live.

RADIO HABANA CUBA

0200 D International News; **0210** M From Habana (Cuban musicians), T-S National News; **0215** T-S Reports and music; **0230** M The Jazz Place or Top Tens, T-S News Bulletin; **0235** S World of Stamps, T-A Reports and music; **0250** S Cuban music.

RADIO KOREA INTERNATIONAL

0200 D News; **0210** S Worldwide Friendship (letters, DX news), M Korean Pop Interactive (requests), T-A News Commentary; **0215** T-A Seoul Calling (magazine); **0230** T Korea Today & Tomorrow (peninsular relations), W Korean Kaleidoscope (society), H Wonderful Korea (travelogue), F Seoul Report.

RADIO NEW ZEALAND INTERNATIONAL

0200 D RNZ News; **0205** S Feature, M-F In Touch with New Zealand (music, interviews, variety), A Eureka! (science)*; **0230** A Health Matters [or] Environment Matters.

[*may be preempted by live sport]

RADIO ROMANIA INTERNATIONAL

0200 D Radio Newsreel; **0210** S The Week, M Focus, T-A Commentary; **0215** S World of Culture, M Sunday Studio, T Pro Memoria (history), W Business Club, H Society Today, F Cards on the Table (debate), A Challenge for the Future or Terra 21st Century [programs alternate]; **0220** S RRI Encyclopedia, T Political Flash, W European Horizons; **0225** S Roots (culture/traditions), T/H Business Update, W Tourist News, F Listeners' Letterbox, A Practical Guide; **0230** S Radio Pictures, M Romanian Itineraries, H Visit Romania, A Cultural Survey; **0235** S Romanian Itineraries, M Listeners' Letterbox, T Performing Arts, W Talking Points or Living Romania [programs alternate], H Partners in a Changing World, F Guest at the Microphone, A Over Coffee (with artists); **0240** S, Bucharest Along the Centuries, T Pages of Romanian Literature, M/F Skylark (folk music), H Stage and Screen, A Off Bucharest; **0245** S DX Mailbag, T Romanian Hits, H Romanian Musicians, A Folk Music Box; **0250** M Romanian Folk Music

At Its Best, T Sports Roundup, W Athlete of the Week, H Sports Club, F Football Flash, A Sports Weekend.

RADIO TAIWAN INTERNATIONAL

0200 D News; **0215** S News Talk, M Jade Bells & Bamboo Pipes (traditional music), T Culture Express, W Taiwan Today, H Discover Taiwan, F Taipei Magazine, A Groove Zone; **0230** S Hakka World (Hakka culture), T Trends, W Instant Noodles (the wacky), H Confucius & Inspiration Beyond, F People; **0240** S Mailbag Time; **0245** M-F Let's Learn Chinese (M/W/F elementary, T/H intermediate), A Kaleidoscope (life in Taiwan).

[This schedule also airs at **0700** for western North America.]

VOICE OF RUSSIA

0200 D News; **0211** M Sunday Panorama, T-S News & Views; **0230** D News in Brief; **0232** S Songs from Russia, M/F Russian by Radio, T Kaleidoscope (Russian events), W Musical Portraits, H Moscow Yesterday & Today, A Audio Book Club (Russian lit.); **0246** S You Write to Moscow; **0254** S/W Russia: People & Events.

WBCQ, Maine

5105 kHz.: **0200** M Squad 51.
7415 kHz.: **0200** S Pan Global Wireless, M Radio New York International (cont'd).

WHRA, Maine

7580 kHz.: **0230** S World Harvest Country Style, M DXing with Cumbre.

WRMI, Florida

7385 kHz.: **0200** S Wavescan; **0230** S Voice of the NASB (US sw broadcasters consortium), M Wavescan.

WWCR, Tennessee

3210 kHz.: **0200** M Cyber Line (digital communications).
5070 kHz.: **0200** S DX Partyline; **0230** S World of Radio.

RADIO BUDAPEST

0230 D News; **0335** S Insight Central Europe; M Europe Unlimited (trade) or Heading for Hungary (travel) or Spotlight (culture) or And the Gatepost (letters), T-A Hungary Today (current events magazine); **0250** A DX Corner.

RADIO SWEDEN

0230 S Network Europe (Europe magazine-1st week)/Sweden Today (2nd)/Spectrum (arts magazine-3rd)/Studio 49 (topical discussion-4th), M In Touch with Stockholm (listener contact-1st)/Sounds Nordic (rock music-exc. 1st), T-A Sixty Degrees North (regional report); **0245** T Sports Scan, W Close Up (profiles of Swedes-1st), F Nordic Lights (1st)/Green Scan (ecology-2nd)/Heart Beat (health-3rd)/The S-Files (things Swedish-4th), A Review of the Newsweek.

VOICE OF VIETNAM

0230 D News; **0235** D Current Affairs; **0240** Su Weekly Review, M Sunday Show, T/W/F/A Press Review, H Talk of the Week; **0245** T Vietnam: Land & People, W Culture & Society, H Letterbox, F Vietnam Economy, A Rural Vietnam; **0250** S Music, A Literature and Arts.

0300 UTC/ 11pm EDT/8pm PDT - Page 46 Freqs

BBC WORLD SERVICE (am)

0300 S World Briefing, M-A News; **0306** M Talking Point (phone-in)/taped S 1406], T-F Outlook (magazine), A Pick of the World (BBC's best); **0332** S Global Business; **0345** M-F Off the Shelf (book readings), A Write On (letters).

CHINA RADIO INTERNATIONAL

0300 D News & Reports; **0310** S Report on

Developing Countries; **0315** A Cutting Edge (sci/tech); **0320** S CRI Roundup; **0330** S In the Spotlight (cultural magazine), M People in the Know (China's leading personalities), T Biz China, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China, A Listeners' Garden.

RADIO AUSTRALIA

0300 D News; **0305** S Verbatim (oral histories), A Rural Reporter; **0310** M-F Regional Sports Report; **0320** M-F Life Matters (social issues); **0330** S Jazz Notes, A Australian Country Style; **0354** Heywire (young rural Australian opinion).

[Special service: **0305** S/A Grandstand (live sports action) on 9660, 12080, 17580, 21725 kHz. only.]

RADIO HABANA CUBA

0300 D International News; **0310** M Weekly Review, T-S National News; **0315** T-S Viewpoint; **0330** M Reports & Music, T-S News Bulletin; **0335** T-A Time Out (sports); **0340** S/W DXers Unlimited, M Mailbag Show, T/H/F Caribbean Outlook, A Weekly Review; **0350** M Breakthrough (science report).

RADIO NEW ZEALAND INTERNATIONAL

0300 S/A* RNZ News, M-F Pacific Regional News; **0305** S Feature*, A Home Grown (NZ music)*; **0308** M-F Dateline Pacific; **0330** M New Music Releases, T Mailbox (letters & DX news) or RNZI Talk (station info), W Tradewinds (Pacific commerce), H The World in Sport, F Pacific Correspondent, A Musical Chairs (artist spotlight)*.

[*may be preempted by live sport]

RADIO PRAGUE

0300 D News; **0305** S Magazine, M Mailbox, T-A Current Affairs; **0310** S Letter from Prague, M ABC of Czech (the language), W Czech Science, H Witness (eyewitness to history), A The Arts; **0315** S/W One on One (interview), M Encore [or] Magic Carpet (both monthly) [or] Czech Books (biweekly), T Talking Point (Czech issues), H Czechs in History [or] Czechs Today (both monthly) [or] Spotlight (travelogue), F Economic Report, A Stepping Out (Prague nightlife).

RADIO TAIWAN INTERNATIONAL

0300 D News; **0315** S Hakka World (Hakka culture), M Taiwan Economic Journal, T Jade Bells & Bamboo Pipes (traditional music), W New Music Chat Room, H Instant Noodles (the wacky), F Formosa Outlook, A News Talk; **0325** A Kaleidoscope (life in Taiwan); **0330** S Asia Pacific (from Radio Australia), M Stage, Screen & Studio, H Life Unusual, F Bookworm; **0340** A Mailbag Time; **0345** M-F Let's Learn Chinese (M/W/F elementary, T/H intermediate).

RADIO UKRAINE INTERNATIONAL

0300 D News; **0310** S Ukrainian Diary (weekly review), M Music from Ukraine, T-A Ukraine Today (magazine); **0315** S The Whole World on the Radio Dial (DX program); **0330** S Hello From Kiev (listener letters/music), M Roots (culture & education); **0345** T-A Closeup (current issues).

VOICE OF AMERICA, Africa Service

0300 S/A News & Reports, M-F Daybreak Africa (morning newsmagazine); **0323** S/A Sports; **0330** D News Headlines; **0333** S Encounter (topical debate), M-F Business Report, A Our World (ecology, science & technology); **0345** M-F Dateline (documentary); **0355** M-F Opinion Roundup.

VOICE OF RUSSIA

0300 D News; **0311** S Music & Musicians, M This is Russia, T Musical Portraits, W/A Moscow Mailbag, H Science Plus, F Newmarket; **0330** D News in Brief; **0332** M Moscow Calling, T/H/A The River of Time, W Guest Speaker, F Russian history/culture; **0347** W Ladies of Character.

Shortwave Guide



VOICE OF TURKEY

0300 D News; **0310** D Press Review; **0315** S Outlook, M Tunes Spanning Centuries, T Last Week, W Live From Turkey, H Review of the Foreign Media, F Big Powers & the Armenian Problem, A Archaeological Settlements in Turkey; **0320** S The Stream of Love or DX Corner, T Hues & Colors of Anatolia, H Letterbox; **0325** M/A Music, F In the Wake of a Contest; **0330** S/T Music; **0335** S Turkish Arts, M Turks in the Mirror of Centuries, T From Past to Present, H Turkey's Off the Beaten Track Sites, F The Culture Parade, A The Travel Itinerary of Anatolia.

WBCQ, Maine

5105 kHz.: **0300** M The Pirate's Cove.
7415 kHz.: **0300** S Michael Ketter Show (satire/free form), M Radio New York International (cont'd).
9330 kHz.: **0300** S Radio Timtron Worldwide.

WHRI, Indiana

7315 kHz.: **0302** S 20 The Countdown Magazine (Christian rock charts);
5745 kHz.: **0300** S Powersource Top 20 (Christian rock music)

WRMI, Florida

7385 kHz.: **0300** S World Radio Network (relay), M VCS Radio (Christian hard rock).

VOICE OF VIETNAM

0330 D News; **0335** D Current Affairs; **0340** Su Weekly Review, M Sunday Show, T/W/F/A Press Review, H Talk of the Week; **0345** T Vietnam: Land & People, W Culture & Society, H Letterbox, F Vietnam Economy, A Rural Vietnam; **0350** S Music, A Literature & Arts.

0400 UTC/ 12am EDT/9pm PDT - Page 47 Freqs

BBC WORLD SERVICE (am)

0400 D World Briefing; **0420** D Sports Roundup;
0432 S Reporting Religion, M-F The World Today, A People & Politics.

CHINA RADIO INTERNATIONAL

0400 D News & Reports; **0410** S Report on Developing Countries; **0415** A Cutting Edge (sci/tech); **0420** S CRI Roundup; **0430** S In the Spotlight (cultural magazine), M People in the Know (China's leading personalities), T Biz China, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China, A Listeners' Garden.

RADIO AUSTRALIA

0400 D News; **0405** S The Europeans, A The Music Show; **0410** M-F Margaret Throsby (interviews and music); **0430** S The Chat Room (interviews); **0455** M-F Perspective (commentary).

[Special service: **0405** S/A Grandstand (live sports action) on 9660, 12080, 17580, 21725 kHz. only.]

RADIO HABANA CUBA

0400 D International News; **0410** M From Habana (Cuban musicians), T-S National News; **0415** T-S Reports and music; **0430** M The Jazz Place or Top Tens, T-S News Bulletin; **0435** S World of Stamps, T-A Reports and music; **0450** S Cuban music.

RADIO NETHERLANDS

0400 S/M News; T-A Newline; **0405** S Wide Angle (in-depth), M Europe Unzipped; **0425** S The Week Ahead (on RN), M Insight (commentary); **0430** S Amsterdam Forum (conversations), M Vox Humana (culture, T Research File (science), W EuroQuest (Europe in context), H Documentary, F Dutch Horizons, A A Good Life (development).

RADIO NEW ZEALAND INTERNATIONAL

0400 S/A RNZ News; **0405** S Sunday Drama* (radio plays), M-F In Touch with NZ (continues from 0205), A Home Grown (cont'd from 0305).

RADIO ROMANIA INTERNATIONAL

0400 D Radio Newsreel; **0410** S The Week, M Focus, T-A Commentary; **0415** S World of Culture, M Sunday Studio, T Pro Memoria (history), W Business Club, H Society Today, F Cards on the Table (debate), A Challenge for the Future or Terra 21st Century [programs alternate]; **0420** S RRI Encyclopedia, T Political Flash, W European Horizons; **0425** S Roots (culture/traditions), T/H Business Update, W Tourist News, F Listeners' Letterbox, A Practical Guide; **0430** S Radio Pictures, M Romanian Itineraries, H Visit Romania, A Cultural Survey; **0435** S Romanian Itineraries, M Listeners' Letterbox, T Performing Arts, W Talking Points or Living Romania [programs alternate], H Partners in a Changing World, F Guest at the Microphone, A Over Coffee (with artists); **0440** S, Bucharest Along the Centuries, T Pages of Romanian Literature, M/F Skylark (folk music), H Stage and Screen, A Off Bucharest; **0445** S DX Mailbag, T Romanian Hits, H Romanian Musicians, A Folk Music Box; **0450** M Romanian Folk Music At Its Best, T Sports Roundup, W Athlete of the Week, H Sports Club, F Football Flash, A Sports Weekend.

VOICE OF AMERICA, Africa Service

0400 D News & Reports; **0415** M-F Focus (a topic in-depth); **0423** D Sports; **0430** S/A News Headlines, M-F Daybreak Africa (morning newsmagazine); **0433** S/A Main Street (life in America).

VOICE OF RUSSIA

0400 D News; **0411** S/M Musical Portraits, T/F Moscow Mailbag, W/A Science Plus, H Newmarket (business); **0430** D News in Brief; **0432** S Kaleidoscope, M Audio Book Club, T Music Around Us, W Moscow Yesterday & Today, H Folk Box, F Audio Book Club (Russian lit.), A Timelines; **0447** T Music At Your Request.

WBCQ, Maine

7415 kHz.: **0400** S Tom & Darryl (electronic media), M-A Amos 'n Andy; **0415** M World of Radio, T Odin Lives (old Norse myths/music).

WHRI, Indiana

7315 kHz.: **0400** S 20 The Countdown Magazine (continued).
5745 kHz.: **0400** S Powersource Top 20 (continued).

WRMI, Florida

7385 kHz.: **0400** S/M World Radio Network (relay).

WWCR Tennessee

5070 kHz.: **0400** S Cyber Line (digital communications).

0500 UTC/ 1am EDT/10pm PDT - Page 47 Freqs

CHANNEL AFRICA, South Africa

0500 S Network Africa (week in review), M-F Dateline Africa (news magazine), A Channel Africa Sport.

CHINA RADIO INTERNATIONAL

0500 D News & Reports; **0510** S Report on Developing Countries; **0515** A Cutting Edge (sci/tech); **0520** S CRI Roundup; **0530** S In the Spotlight (cultural magazine), M People in the Know (China's leading personalities), T Biz China, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China, A Listeners' Garden.

RADIO AUSTRALIA

0500 D News; **0505** S All in the Mind (the brain), A The Music Show (cont'd); **0510** M-F Pacific Beat (Pacific islands magazine with regional sports report @ 0530); **0530** S The Ark (religious history); **0549** S The Pulse (Aussie music now).

[Special service: **0505** S/A Grandstand (live sports action) on 9660, 12080, 17580, 21725 kHz. only.]

RADIO HABANA CUBA

0500 D International News; **0510** M Weekly Review, T-S National News; **0515** T-S Viewpoint; **0530** M Reports & Music, T-S News Bulletin; **0535** T-A Time Out (sports); **0540** S/W DXers Unlimited, M Mailbag Show, T/H/F Caribbean Outlook, A Weekly Review; **0550** M Breakthrough (science report).

RADIO JAPAN - NHK WORLD

0500 D News; **0510** S Pop Joins the World, A Hello from Tokyo (listener contact); **0515** M-F 44 Minutes (magazine).

RADIO NEW ZEALAND INTERNATIONAL

0500 S/A RNZ News; M-F Checkpoint; **0510** S Religion feature or series, A Tagata O Te Moana (Pacific magazine); **0540** S Jazz Spotlight

RVi, Belgium

0500 S Music from Flanders, M Radio World, T-A News; **0504** T-A Flanders Today (incl. press review, reports & CD of the Week); **0508** M Tourism in Flanders; **0514** M Brussels 1043 (letters).

VOICE OF AMERICA, Africa Service

0500 S News, M-A News & Reports; **0523** M-A Sports Report; **0530** D News Headlines; **0533** S Issues in the News, M-F Business Report, A Press Conference USA; **0545** M-F Dateline (documentary); **0555** M-F Opinion Roundup.

VOICE OF NIGERIA

0500 S/A News Summary, M-F VON Scope (news magazine); **0505** S This Week on VON, A VON Link-up (music requests); **0530** D Moving On (variety magazine).

WBCQ, Maine

7415 kHz.: **0500** S Juliet's Wild Kingdom, M Joe Mazza Show (everything but politics).

WHRI, Indiana

7315/5745 kHz.: **0500** A DXing with Cumbre; **0530** A World Harvest Country Style.

WRMI, Florida

7385 kHz.: **0500** S/M World Radio Network (relay).

WWCR, Tennessee

5070 kHz.: **0530** M-F Natural Health Clinic.

0600 UTC/ 2am EDT/11pm PDT - Page 47 Freqs

CHANNEL AFRICA, South Africa

0600 S Network Africa (week in review), M-F Dateline Africa (news magazine), A Channel Africa Sport.

RADIO AUSTRALIA

0600 D News; **0605** S The Arts on RA, A Verbatim (oral histories); **0610** M-F Regional Sports Report; **0620** M Ockham's Razor (science opinion), T In Conversation (about science), W Lingua Franca (about language), H The Ark (religious history), F The Makers (artists); **0630** S Hit Mix (pop/rock), A In Conversation; **0635** M Hit Mix, T Music Deli (diverse world/folk), W Jazz Notes, H Australian Country Style, F The Chat Room (interviews).

[Special service: **0605** S/A Grandstand (live sports action) on 9660, 12080, 17580, 21725 kHz. only.]

RADIO HABANA CUBA

0600 D International News; **0610** M From Habana (Cuban musicians), T-S National News; **0615** T-S Reports and music; **0630** M The Jazz Place or Top Tens, T-S News Bulletin; **0635** S World of Stamps, T-A Reports and music; **0650** S Cuban music.

RADIO JAPAN - NHK WORLD

0600 D News; **0610** S Weekend Square (Japanese life), M-F Songs for Everyone, A Pop Joins the World; **0615** M-F Asian Top News (headlines from region's radio); **0625** M Japan Music Treasure Box,

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T Basic Japanese for You, W Japan Musicscape, H Brush Up Your Japanese, F Music Beat; **0654** S Japan: Take Five.

RADIO NEW ZEALAND INTERNATIONAL

0600 D RNZ News; **0607** S Mana Korero (Maori magazine), M-F Worldwatch & Pacific Report, A The Mix ('live' music acts); **0630** M Letter from America (Alistair Cooke); **0645** M-F Storytime.

VOICE OF AMERICA, Africa Service

0600 S/A News & Reports, M-F Daybreak Africa (morning newsmagazine); **0623** S/A Sports; **0630** S/A News Headlines; **0633** S/A Main Street (life in America).

VOICE OF NIGERIA

0600 D Nigeria/Africa/World News (magazine); **0630** S In the News, A News Maker; **0645** A Window on Abuja.

WBCQ, Maine

7415 kHz.: **0600** M Joe Mazza Show (cont'd)

WHRI, Indiana

7315 kHz.: **0605** A Turn Your Radio On (southern gospel music).
5745 kHz.: **0630** S DXing with Cumbre.

WRMI, Florida

7385 kHz.: **0600** S/M World Radio Network (relay).

WWCR, Tennessee

3210 kHz.: **0630** S World of Radio.

1000 UTC/ 6am EDT/3am PDT - Page 49 Freqs

BBC WORLD SERVICE (am)(eas)

1000 S/A News, M-F World Briefing; **1006** S From Our Own Correspondent, A Assignment; **1032** S Reporting Religion, M-F World Business Report, A The Interview (trends); **1045** M-H Sports Roundup, F Football Extra.

RADIO AUSTRALIA

1000 D News; **1005** S Keys to Music (enjoying the classics), M-F Asia Pacific (regional current affairs), A Background Briefing; **1030** M Health Report, T Law Report, W Religion Report, H Media Report, F The Sports Factor; **1055** A Reporter's Notebook.

RADIO NEW ZEALAND INTERNATIONAL

1000 D News; **1012** S New Music Releases, M-F Late Edition (the day's news), A Deep Purple (relaxing music/nostalgia).

WHRI, Tennessee

9495 kHz.: **1005** S Turn Your Radio On (southern gospel music).

WWCR, Tennessee

15825 kHz.: **1000** M-F Worldwide Country Radio;
1015 S Ask WWCR.
5070 kHz.: **1010** S A View from Europe; **1030** A World of Radio

1100 UTC/ 7am EDT/4am PDT - Page 50 Freqs

BBC WORLD SERVICE (am)

1100 D World Briefing; **1105** M-F Caribbean Morning Report; **1110** M-F Sports Caribbean; **1115** M-F Caribbean Magazine; **1120** D British News; **1132** S Instant Guide (background), M Letter from America, TWF Analysis, H From Our Own Correspondent, A World Football; **1145** S-F Sports Roundup.

BBC WORLD SERVICE (eas)

1100 S World Briefing, M-A News; **1106** M-F Outlook (magazine), A The Ticket (global arts survey); **1120** S British News; **1132** S Play of the Week (radio theatre); **1145** M-F Off the Shelf (book readings).

CHINA RADIO INTERNATIONAL

1100 D Real Time Beijing (world/national/city news, business, sports, press, sci-tech, culture, show-biz, music, features); **1115** S China Beat (popular music), A China Roots (traditional music).

HCJB ECUADOR

1100 S Let My People Think, M-F Insight for Living, A Down Gilead Lane; **1130** S Renewing Your Mind, M-F Family Life Today, A Adventures in Odyssey.

RADIO AUSTRALIA

1100 D News; **1105** S Correspondents' Report, M-A Asia Pacific (regional current affairs); **1130** S The Arts on RA, M-F Bush Telegraph (rural life), A All in the Mind (the brain).

RADIO JAPAN - NHK WORLD

1100 D News; **1110** S Hello from Tokyo (listener contact), M-F Songs for Everyone, A Pop Joins the World; **1115** M-F Asian Top News (headlines from region's radio); **1125** M Japan Music Treasure Box, T Basic Japanese for You, W Japan Musicscape, H Brush Up Your Japanese, F Music Beat.

RADIO KOREA INTERNATIONAL

1130 D News; **1140** S Korean Pop Interactive (requests), M-F News Commentary, A Worldwide Friendship (letters, DX news); **1145** M-F Seoul Calling (magazine).

RADIO NETHERLANDS

1100 S Aural Tapestry (culture), M EuroQuest (Europe in context), T A Good Life (development issues), W Dutch Horizons, H Research File (science), F Documentary, A Amsterdam Forum (conversations); **1130** S Dutch Horizons, M Research File, T/A Music 52-15 (international music), W Documentary, H Aural Tapestry, F A Good Life.

RADIO NEW ZEALAND INTERNATIONAL

1100 S/A RNZ News, M-F Pacific Regional News; **1105** S/A Forces Programme (for NZ personnel serving in PNG & E. Timor); **1108** M-F Dateline Pacific; **1130** M New Music Releases, T Mailbox (letters & DX news) or RNZI Talk (station info), W Tradewinds (Pacific commerce), H The World in Sport, F Pacific Correspondent.

RADIO SWEDEN

1130 S In Touch with Stockholm (listener contact-1st)/ Sounds Nordic (rock music-exc. 1st), M-F Sixty Degrees North (regional report), A Network Europe (Europe magazine-1st week)/Sweden Today (2nd)/ Spectrum (arts magazine-3rd)/Studio 49 (topical discussion-4th); **1145** M Sports Scan, T Close Up (profiles of Swedes-1st), H Nordic Lights (1st)/ Green Scan (ecology-2nd)/Heart Beat (health-3rd)/ The S-Files (things Swedish-4th), F Review of the Newsweek.

WRMI, Florida

9955 kHz.: **1100** W Voice of the NASB (US sw broadcasters consortium), T/F Viva Miami (magazine/letters/DX news); **1130** F Wavescan.

WWCR, Tennessee

5070 kHz.: **1110** A A View from Europe.

1200 UTC/ 8am EDT/5am PDT - Page 50 Freqs

BBC WORLD SERVICE (am)

1200 D Newshour; **1205** M-F Caribbean Business; **1210** M-F Caribbean Morning Report 2nd Edition; **1220** M-F Caribbean Magazine; **1230** M-F Newshour (cont'd.).

BBC WORLD SERVICE (eas)

1200 S Play of the Week (continues), M-A News; **1201** A In Concert (performances); **1206** M/W Documentaries, T Masterpiece (arts ideas), H Assignment, F Sports International; **1232** S

Reporting Religion, M Music Feature, T White Label (new music), W Charlie Gillett (world music), H Music Biz, F John Peel (eclectic).

HCJB ECUADOR

1200 S Moody Presents, M-F Precept, A Hour of Decision; **1215** M-F Proclaim; **1230** S The Living Word, M-F Renewing Your Mind, A DX Partyline.

RADIO AUSTRALIA

1200 D News; **1205** S The Spirit of Things (spiritual matters), M-H Late Night Live (discussion & interviews), F Sound Quality (innovative music), A The Music Show; **1255** S The Pulse (Aussie music now).

RADIO CANADA INTERNATIONAL

1200 M-F News; **1205** M-F The Current (current affairs-joined in progress).

RADIO KOREA INTERNATIONAL

1200 S Korean Pop Interactive (cont'd), M-F Seoul Calling (cont'd), A Worldwide Friendship (cont'd); **1215** M Korea Today & Tomorrow (peninsula issues), T Korean Kaleidoscope (Korean society), W Wonderful Korea (tourism), H Seoul Report (interviews).

RADIO NETHERLANDS

1200 S/A News, M-F Newline; **1205** S Wide Angle (in-depth), A Europe Unzipped; **1225** S The Week Ahead (on RN), A Insight (comment); **1230** S Vox Humana (culture), M Research File (science), T EuroQuest (Europe in context), W Documentary, H Dutch Horizons, F A Good Life (development issues), A Amsterdam Forum (conversations).

RADIO NEW ZEALAND INTERNATIONAL

1200 S-F RNZ News, A Forces Programme (cont'd.); **1205** S Sportsworld (recap magazine), M-F Late Edition.

RADIO SWEDEN

1230 S In Touch with Stockholm (listener contact-1st)/ Sounds Nordic (rock music-exc. 1st), M-F Sixty Degrees North (regional report), A Network Europe (Europe magazine-1st week)/Sweden Today (2nd)/ Spectrum (arts magazine-3rd)/Studio 49 (topical discussion-4th); **1245** M Sports Scan, T Close Up (profiles of Swedes-1st), H Nordic Lights (1st)/ Green Scan (ecology-2nd)/Heart Beat (health-3rd)/ The S-Files (things Swedish-4th), F Review of the Newsweek.

WHRI, Indiana

9495 kHz.: **1230** A DXing with Cumbre.
9840 kHz.: **1205** A Turn Your Radio On (southern gospel music).

WRMI, Florida

15725 kHz.: **1200** A World Radio Network (relay)

1300 UTC/ 9am EDT/6am PDT - Page 51 Freqs

BBC WORLD SERVICE (am)

1300 D News; **1306** S Documentaries, M-F Outlook (magazine), A Pick of the World (BBC's best); **1332** S In Praise of God; **1345** M-F Off the Shelf (book readings), A Write On (letters).

BBC WORLD SERVICE (eas)

1300 D Newshour.

CHANNEL AFRICA, South Africa

1300 S/A Channel Africa Extra (weekend variety magazine).

CHINA RADIO INTERNATIONAL

1300 D News & Reports; **1310** S Report on Developing Countries; **1315** A Cutting Edge (sci/tech); **1320** S CRI Roundup; **1330** S In the Spotlight (cultural magazine), M People in the Know

Shortwave Guide



(China's leading personalities), T Biz China, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China, A Listeners' Garden.

RADIO AUSTRALIA

1300 D News; **1305** S Encounter (religion in Australia), M-F The Planet (diverse music from around the world), A The Music Show (cont'd); **1355** S Perspective (commentary).

RADIO CANADA INTERNATIONAL

1300 D News; **1305** S The Sunday Edition, M-F Sounds Like Canada (Canadian magazine); A The House (Canadian politics).

RADIO NEW ZEALAND INTERNATIONAL

1300 S/A RNZ News, M-F Pacific Regional News; **1305** S Tagata o te Moana, A New Music Releases; **1308** M-F Dateline Pacific; **1330** M New Music Releases, T Mailbox (letters & DX news) or RNZI Talk (station info), W Tradewinds (Pacific commerce), H The World in Sport, F Pacific Correspondent.

RADIO SWEDEN

1330 S In Touch with Stockholm (listener contact-1st)/ Sounds Nordic (rock music-exc. 1st), M-F Sixty Degrees North (regional report), A Network Europe (Europe magazine-1st week)/Sweden Today (2nd)/ Spectrum (arts magazine-3rd)/Studio 49 (topical discussion-4th); **1345** M Sports Scan, T Close Up (profiles of Swedes-1st), H Nordic Lights (1st)/ Green Scan (ecology-2nd)/Heart Beat (health-3rd)/ The S-Files (things Swedish-4th), F Review of the Newsweek.

WHRA, Maine

17560 kHz.: **1330** S World Harvest Country Style.

WHRI, Indiana

15105 kHz.: **1303** S World Harvest Country Style.

WRMI, Florida

15725 kHz.: **1300** A World Radio Network (relay); **1330** S Viva Miami!

WWCR Tennessee

15825 kHz.: **1300** M-F Worldwide Country Radio.

1400 UTC/ 10am EDT/7am PDT - Page 51 Freqs

BBC WORLD SERVICE (am)

1400 D News; **1406** S Talking Point (live phone-in), M/W Documentaries, T Masterpiece (arts ideas), H Assignment, F Sports International, A Sportsworld (live action); **1432** M Music Feature, T White Label (new music), W Charlie Gillett (world music), H Music Biz, F John Peel (eclectic).

BBC WORLD SERVICE (eas)

1400 S/A News, M-F East Asia Today; **1406** S Talking Point (live phone-in), A Sportsworld (live action); **1432** M-F British News; **1445** M-H Sports Roundup, F Football Extra.

CHANNEL AFRICA, South Africa

1400 S/A Channel Africa Extra (cont'd from 1300).

CHINA RADIO INTERNATIONAL

1400 D News & Reports; **1410** S Report on Developing Countries; **1415** A Cutting Edge (sci/tech); **1420** S CRI Roundup; **1430** S In the Spotlight (cultural magazine), M People in the Know (China's leading personalities), T Biz China, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China, A Listeners' Garden.

RADIO AUSTRALIA

1400 D News; **1405** S The Science Show, M-F

Margaret Throsby (interview/music), A Background Briefing (documentaries).

RADIO CANADA INTERNATIONAL

1400 D News; **1405** S The Sunday Edition (cont'd.), M-F Sounds Like Canada (cont'd., including **1430** F C'est La Vie (life in French Canada), **1445** T-F Out Front (first person views of life), A Vinyl Cafe.

RADIO JAPAN - NHK WORLD

1400 D News; **1410** S Pop Joins the World, A Weekend Japanology; **1415** M-F 44 Minutes (feature magazine); **1454** A Japan: Take Five.

RADIO NEW ZEALAND INTERNATIONAL

1400 D RNZ News; **1405** S In a Mellow Tone, M-F Wayne's Music, A Spiritual Outlook.

RADIO SWEDEN

1430 S In Touch with Stockholm (listener contact-1st)/ Sounds Nordic (rock music-exc. 1st), M-F Sixty Degrees North (regional report), A Network Europe (Europe magazine-1st week)/Sweden Today (2nd)/ Spectrum (arts magazine-3rd)/Studio 49 (topical discussion-4th); **1445** M Sports Scan, T Close Up (profiles of Swedes-1st), H Nordic Lights (1st)/ Green Scan (ecology-2nd)/Heart Beat (health-3rd)/ The S-Files (things Swedish-4th), F Review of the Newsweek.

WRMI, Florida

15725 kHz.: **1400** S Wavescan, A World Radio Network (relay).

1500 UTC/ 11am EDT/8am PDT - Page 52 Freqs

BBC WORLD SERVICE (am)

1500 D News; **1506** S Assignment, M Health Matters, T Go Digital, W Discovery (science), H One Planet (ecology), F Science in Action, A Sportsworld (live action from 1406); **1532** S People & Politics, M Quiz or panel game, T Music Review, W/F Westway (drama serial), H The Word (writers & writing) [exc. last Thu., World Book Club (discussion)]; **1545** W Heart & Soul (beliefs & values), F What's the Problem? (advice).

BBC WORLD SERVICE (eas)

1500 D News; **1501** S In Concert (performances); **1506** M Health Matters, T Go Digital, W Discovery (research), H One Planet (ecology), F Science in Action, A Sportsworld (live action from 1406); **1532** S/M Quiz or panel game, T Music Review, W/F Westway, H The Word (writers & writings) [exc. last Thu., World Book Club (discussion)]; **1545** W Heart & Soul (beliefs & values), F What's the Problem? (advice).

CHINA RADIO INTERNATIONAL

1500 D News & Reports; **1510** S Report on Developing Countries; **1515** A Cutting Edge (sci/tech); **1520** S CRI Roundup; **1530** S In the Spotlight (cultural magazine), M People in the Know (China's leading personalities), T Biz China, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China, A Listeners' Garden.

RADIO AUSTRALIA

1500 D News; **1505** S The National Interest, M-F Asia Pacific (regional current affairs), A Educational series; **1530** M Health Report, T Law Report, W Religion Report, H Media Report, F The Sports Factor; **1555** S The Pulse (Aussie new music), A Business Weekend.

RADIO AUSTRIA INTERNATIONAL

1505 S/A Insight Central Europe; **1515** M-F Report from Austria; **1525** S/A Listener Letters; **1535** S/A Insight Central Europe; **1545** M-F Report from Austria; **1555** S/A Listener Letters.

RADIO CANADA INTERNATIONAL

1500 D News; **1505** S The Sunday Edition (cont'd.), A Quirks & Quarks (science).

RADIO JAPAN

1500 D News, **1505** S Hello from Tokyo (letters), M-F Songs for Everyone, A Pop Joins the World; **1515** M-F Asian Top News (reports from region's radio); **1525** M Japan Music Treasure Box, T Basic Japanese for You, W Japan Musicscape, H Brush Up Your Japanese, F Music Beat.

RADIO NEW ZEALAND INTERNATIONAL

1500 S/A RNZ News, M-F Pacific Regional News; **1505** S/A Forces Radio; **1508** M-F Dateline Pacific; **1530** M New Music Releases, T Mailbox (letters & DX news) or RNZI Talk (station info), W Tradewinds (Pacific commerce), H The World in Sport, F Pacific Correspondent.

WHRI, Indiana

15105 kHz.: **1530** S DXing with Cumbre.
13760 kHz.: **1500** A DXing with Cumbre.

WRMI, Florida

15725 kHz.: **1500** A World Radio Network (relay).

1600 UTC/ 12pm EDT/9am PDT - Page 52 Freqs

BBC WORLD SERVICE (am)

1600 S/A News, M-F Europe Today; **1606** S Sunday Sportsworld, A Sportsworld (live action from 1406).

RADIO AUSTRALIA

1600 D News; **1605** S Books & Writing, M-F Bush Telegraph (rural/outback Australia), A Hindsight (social history); **1635** Book Talk.

VOICE OF AMERICA, Africa Service

1600 S/A Nightline Africa (weekend newsmagazine), M-F News & Reports; **1615** M-F Focus (a topic in-depth); **1623** M-F Sports; **1630** M-F Africa World Tonight.

WBCQ, Maine

17495 kHz.: **1600** A Allan Weiner Worldwide.

WHRI, Indiana

15105 kHz.: **1600** A Sports Spectrum Live

WRMI, Florida

15725 kHz.: **1600** A World Radio Network (relay).

WWCR, Tennessee

15825 kHz.: **1600** S Latin Catholic Mass, M-F Worldwide Country Radio.

1700 UTC/ 1pm EDT/10am PDT - Page 53 Freqs

CHANNEL AFRICA, South Africa

1700 S Network Africa (week in review), M-F Dateline Africa (news magazine), A Channel Africa Sport.

RADIO AUSTRALIA

1700 D News; **1705** S Sound Quality (innovative music), M-F Australia Talks Back (phone-in), A The Spirit of Things (spiritual matters); **1755** M-F Perspective (commentary), A The Pulse (Aussie new music).

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RADIO JAPAN - NHK WORLD

1700 D News; **1710** S Pop Joins the World, M-F Songs for Everyone, A Hello from Tokyo (listener contact); **1715** M-F 44 Minutes (feature magazine).

VOICE OF AMERICA, Africa Service

1700 S Reporters' Roundtable, M-A News; **1706** M-F Talk to America (global phone-in), A (no information available from VOA); **1730** S Music Time in Africa; **1755** A Government Editorial.

VOICE OF GREECE

1700 A All Greek to Me (Greek popular & traditional music)

ALL INDIA RADIO

1745 M Light Music, T Karnatak Instrumental Music, W Folk Songs, H-S Devotional Music.

WBCQ, Maine

17495 kHz.: **1700** A Zombo's Mondo Record Party.

WRMI, Florida

15725 kHz.: **1700** A World Radio Network (relay).

WWCR, Tennessee

15825 kHz.: **1715** W Ask WWCR (exc. 2nd/3rd W). **12160** kHz.: **1710** S A View from Europe; **1730** S Ask WWCR.

1800 UTC/ 2pm EDT/11am PDT - Page 53 Freqs

ALL INDIA RADIO

1800 D News; **1810** D Commentary; **1815** W Instrumental Music—Old Masters, H-T Hindustani Classical Vocal Music; **1830** S Sports Roundup (1st wk)/Feature (2nd)/Film Story (3rd)/Discussion (4th), M Faithfully Yours (letters), T Cultural Talk, W Book Review (1st)/Window on Science (2nd/4th)/Times & Lives (biography-3rd), H General Talk, F Focus (magazine-1st)/Horizon (literature-2nd/4th)/Music (3rd), A For Youth (1st)/Indian Classics (books-2nd)/From the Archives (3rd)/Quiz Time (4th); **1840** M DXers Corner (2nd/4th), T Film Songs of Yesteryears, W Hits from Films, H Light Karnatak Music, F Light Instrumental Music; **1850** M Film Songs, F Light Music.

CHANNEL AFRICA, South Africa

1800 S Network Africa (week in review), M-F Dateline Africa (news magazine), A Channel Africa Sport.

RADIO AUSTRALIA

1800 D News; **1805** S-H Pacific Beat (Pacific islands magazine), F Pacific Review, A Best of 'Late Night Live' (interviews); **1830** F Country Breakfast (rural life).

VOICE OF AMERICA, Africa Service

1800 S/A News & Reports, M-F Africa World Tonight; **1805** S On the Line (US foreign policy), A Our World (science magazine); **1830** S/A News Headlines, W Straight Talk Africa (continental phone-in); **1833** S Encounter (issues debated), A On the Line (US foreign policy); **1855** S/A Government Editorial.

WBCQ, Maine

17495 kHz.: **1800** A Radio Timtron Worldwide.

WHRI, Indiana

9495 kHz.: **1800** A World Harvest Country Style; **1805** S Pat Boone (variety), M-F Chuck Harder (populist political phone-in)

WRMI, Florida

15725 kHz.: **1800** A World Radio Network (relay).

WWCR, Tennessee

12160 kHz.: **1800** M-F Natural Health Clinic, A Real Talk Radio; **1830** M-F Stairway to Health.

1900 UTC/ 3pm EDT/12pm PDT - Page 54 Freqs

ALL INDIA RADIO

1900 D News; **1905** D Press Review; **1910** S Women's World, M/W/F Radio Newsreel, T Of Persons, Places & Things (1st/3rd wk)/Our Guest (interviews-2nd/4th), H Panorama of Progress, A Mainly for Tourists (1st/3rd)/Indian Cinema (2nd)/On the Export Front (4th); **1920** S/M/W/F Film Songs, T Light Classical Music, H Light Instrumental Music, A Karnatak Classical Music; **1930** D Commentary; **1935** S/H/F Film Songs, M Karnatak Vocal Music, T Folk Songs, W/A Light Music.

RADIO AUSTRALIA

1900 D News; **1905** F Rural Reporter, A Australia All Over; **1910** S-H Pacific Beat (regional magazine w/ Sport @ 1929); **1930** F Australian Country Style (music).

RADIO NETHERLANDS

1900 S Documentary, A Vox Humana (culture); **1930** S/A News; **1935** S Wide Angle (in-depth), A Europe Unzipped; **1955** S The Week Ahead (on RN), A Insight (commentary).

VOICE OF AMERICA, Africa Service

1900 S News & Reports, M-F News, A Hip Hop Connections (music); **1906** M-F Border Crossings (music—exc. W Straight Talk Africa cont'd.); **1923** S Sports; **1930** S Music Time in Africa (part 2), M-F World of Music, A News Headlines; **1933** A Press Conference USA.

VOICE OF NIGERIA

1900 S Youth Forum, M Our Cities, T Our Environment, W Who Are the Nigerians?, H Listeners' Letters, F Nigerian Scene, A Folktales; **1915** H Wheel of Progress, F Business Weekly, A Nigerian Newsletter; **1930** S Window on Abuja, M Perspectives, T African Monarchy, W Theatre on the Air, H Women and Development, F Weekend Magazine, A Time for Highlife; **1945** S From the Bookshelf, T Listeners' Letters.

WBCQ, Maine

7415 kHz.: **1945** H Planet World News. **9330** kHz.: **1945** A Planet World News.

WHRI, Indiana

9495 kHz.: **1905** M-F Chuck Harder (continued); **1930** A DXing with Cumbre.

WRMI, Florida

15725 kHz.: **1900** A World Radio Network (relay).

WWCR, Tennessee

15825 kHz.: **1900** A U.S. Presidential Radio Address/ Democratic Response. **12160** kHz.: **1900** A Real Talk Radio (continues); **1930** S Ken's Country Classics.

2000 UTC/ 4pm EDT/1pm PDT - Page 54 Freqs

RADIO AUSTRALIA

2000 D News; **2005** F Pacific Review, A Australia All Over; **2010** S-H Pacific Beat (regional magazine w/ Sport @ 2029); **2030** F The Buzz (technology).

RADIO NETHERLANDS

2000 S Vox Humana (culture), A Amsterdam Forum (conversations); **2030** S/A News; **2035** S Wide Angle (in-depth), A Europe Unzipped; **2055** S The Week Ahead (on RN), A Insight (commentary).

VOICE OF NIGERIA

2000 S News Bulletin, M-F Sixty Minutes, A African Hour; **2015** S Sports Roundup; **2030** S In the News.

VOICE OF AMERICA, Africa Service

2000 S/A Nightline Africa (weekend magazine), M-F Africa World Tonight.

ALL INDIA RADIO

2045 D Press Review; **2050** S/T Instrumental Music, M/F Folk Songs, W Light Music, H Classical Indian Vocal Music, A Regional Indian Devotional Music.

WBCQ, Maine

7415 kHz.: **2000** S/A The Last Roundup. **17495** kHz.: **2030** A World of Radio.

WHRI, Tennessee

5745 kHz.: **2000** S World Harvest Country Style.

WRMI, Florida

15725 kHz.: **2000** A World Radio Network (relay).

WWCR, Tennessee

15825 kHz.: **2000** H DX Partyline; **2030** H World of Radio, F Ask WWCR. **12160** kHz.: **2000** S Worldwide Country Radio; **2030** A World of Radio.

2100 UTC/ 5pm EDT/2pm PDT - Page 55 Freqs

ALL INDIA RADIO

2100 D News; **2105** D Commentary; **2111** S Regional Film Songs, M/A Classical Indian Vocal Music, T Karnatak Vocal Music, W/H Instrumental Music, F Orchestral Music; **2120** S Sports Roundup (1st wk)/Feature (2nd)/Film Story (3rd)/Discussion (4th), M Faithfully Yours (letters), T Cultural Talk, W Radio Newsreel, H Panorama of Progress, F Focus (magazine-1st wk)/Horizon (literature-2nd/4th)/Indian Music (3rd), For Youth (1st)/Indian Classics (books-2nd)/From the Archives (3rd)/Quiz Time (4th); **2130** M DXers Corner (2nd/4th), T/W Film Songs, H Classical Half-Hour, A Old Film Songs; **2140** F Film Songs; **2145** M Film Songs; **2150** S Karnatak Vocal Music.

BBC WORLD SERVICE (am)

2100 D News; **2101** A Play of the Week; **2106** S Documentaries, M Health Matters, T Go Digital, W Discovery, H One Planet, F Science in Action; **2132** M Quiz or panel game, T Music Review, W/F Westway (drama serial), H The Word (writers & writings) [exc. last Thu., World Book Club (discussion)]; **2145** W Heart & Soul (beliefs & values), F What's the Problem? (advice).

[*Special service to the Caribbean on 5975, 11675, 15390 kHz.: **2115** M-F Caribbean Report. Special service to the Falklands on 11680 kHz.: **2130** T/F Calling the Falklands.]

DEUTSCHE WELLE

2100 News; **2105** S Hard to Beat (sport), M-F Newslink Africa, A Religion & Society; **2115** S Inspired Minds, A German by Radio; **2130** S Hits in Germany [or] Melody Time, M A World of Music, T Arts on the Air, W Living in Germany, H Cool (youth culture), F Focus on Folk, A Africa This Week; **2145** W Europe in Capitals.

RADIO AUSTRALIA

2100 D News; **2105** F Verbatim (oral history), A Australia All Over (cont'd); **2110** S-H AM (morning news magazine); **2130** S Country Breakfast (rural life), M Earthbeat (ecology), T Innovations (new products), W Educational series, H All in the Mind (the brain), F In Conversation (about science); **2145** A Asia Sunday.

RADIO JAPAN - NHK WORLD

2100 D News; **2110** S Pop Joins the World, M-F Songs for Everyone, A Weekend Japanology; **2115** M-F Asian Top News (headlines from region's radio); **2125** M Japan Music Treasure Box, T Basic Japanese for You, W Japan Musicscape, H Brush Up Your Japanese, F Music Beat; **2154** A Japan: Take 5.

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RADIO PRAGUE

2130 D News; **2135** S Mailbox, M-F Current Affairs, A Insight Central Europe; **2140** S ABC of Czech (the language), T Czech Science, W Witness (eyewitness to history), F The Arts; **2145** S Encore [or] Magic Carpet (both monthly) [or] Czech Books (biweekly), M Talking Point (Czech issues), T One on One (interview), W Czechs in History [or] Czechs Today (both monthly) [or] Spotlight (travelogue), H Economic Report, F Stepping Out (Prague nightlife).

VOICE OF AMERICA, Africa Service

2100 D News; **2106** S/A Jazz America, M American Gold, T Roots and Branches, W Classic Rock, H Top 20, F Country Hits.

WBCQ, Maine

7415 kHz.: **2100** S Radio Free Euphoria/Radio Three, M Jean Shepherd, H Planet World News Roundup, F Frankie V Radio Show; **2130** H The Last Roundup, F Pab Sungenis Project.
9330 kHz.: **2100** S Frankie V Radio Show, A Allan Weiner Worldwide.

WHRA, Maine

17650 kHz.: **2100** F DXing with Cumbre.

WHRI, Indiana

9495 kHz.: **2130** A DXing with Cumbre.
5745 kHz.: **2100** S DXing with Cumbre; **2105** M-H For the People (populist political phone-in).

2200 UTC/ 6pm EDT/3pm PDT - Page 56 Freqs

ALL INDIA RADIO

2200 D News; **2210** D Commentary; **2215** S Women's World, M/F Radio Newsreel, T Of Persons, Places & Things (1st/3rd wk)/Our Guest (interview-2nd/4th), W Book Review (1st)/Window on Science (2nd/4th)/Times & Lives (biography-3rd), H General Talk, A Mainly for Tourists (1st/3rd)/Indian Cinema (2nd)/On the Export Front (4th); **2225** D Film Tune.

BBC WORLD SERVICE (am)

2200 D The World Today; **2232** F Global Business, A The Interview.

RADIO AUSTRALIA

2200 D News; **2205** F Asia Pacific (regional current affairs), A Correspondents' Report; **2210** S-H AM (morning news magazine); **2230** F AM Saturday (morning news magazine), A Music Deli (international); **2240** S-H Australia Wide (national report); **2254** A-H Perspective (commentary).

RADIO CANADA INTERNATIONAL

2200 S/A The World This Weekend, M-F The World at 6; **2230** S Inside Track (sports anthologies) M-F As It Happens (interviews with newsmakers), A Madly Off in All Directions.

RADIO PRAGUE

2230 D News; **2235** S Mailbox, M-F Current Affairs, A Insight Central Europe; **2240** S ABC of Czech (the language), T Czech Science, W Witness (eyewitness to history), F The Arts; **2245** S Encore [or] Magic Carpet (both monthly) [or] Czech Books (biweekly), M Talking Point (Czech issues), T One on One (interview), W Czechs in History [or] Czechs Today (both monthly) [or] Spotlight (travelogue), H Economic Report, F Stepping Out (Prague nightlife).

RVi, Belgium

2200 S Radio World, M-F News, A Music from Flanders; **2204** M-F Flanders Today (incl. press review, reports & 'CD of the Week'); **2208** S Tourism in Flanders; **2214** S Brussels 1043 (letters).

VOICE OF TURKEY

2200 D News; **2210** D Press Review; **2215** S Tunes Spanning Centuries, M Last Week, T Live From Turkey, W Review of the Foreign Media, H Big Powers & the Armenian Problem, F Archaeological Settlements in Turkey, A Outlook; **2220** M Hues & Colors of Anatolia, W Letterbox, A The Stream of Love or DX Corner; **2225** S/F Music, H In the Wake of a Contest; **2230** M/A Music; **2235** S Turks in the Mirror of Centuries, M From Past to Present, W Turkey's Off the Beaten Track Sites, H The Culture Parade, F The Travel Itinerary of Anatolia, A Turkish Arts.

WBCQ, Maine

5105 kHz.: **2200** S Jean Shepherd.
7415 kHz.: **2200** W World of Radio, H The Last Roundup (cont'd), F Pab Sungenis Project (cont'd), A Radio Timtron Worldwide; **2230** W Think Tank North America (the bizarre), H Uncle Ed's Musical Memories, F Wanton Display of Control & Disruption.
9330 kHz.: **2200** A The Country Music Hour; **2230** S The Alternative Transportation Show.
17495 kHz.: **2200** W World of Radio.

WHRI, Indiana

5745 kHz.: **2205** A Turn Your Radio On (southern gospel music).

WRMI, Florida

15725 kHz.: **2230** A Viva Miami (magazine/letters/DX news).

2300 UTC/ 7pm EDT/4pm PDT - Page 56 Freqs

BBC WORLD SERVICE (am)

2300 D News; **2306** S Age of Empire (America in the modern world), M-F Outlook (magazine), A Pick of the World (BBC's best); **2332** S Quiz or panel game; **2345** M-F Off the Shelf (book readings), A Write On (letters).

CHINA RADIO INTERNATIONAL

2300 D News & Reports; **2310** A Report on Developing Countries; **2315** F Cutting Edge (sci/tech); **2320** A CRI Roundup; **2330** S People in the Know (China's leading personalities), M Biz China, T China Horizons (China outside Beijing), W Voices from Other Lands, H Life in China, F Listeners' Garden, A In the Spotlight (cultural magazine).

RADIO AUSTRALIA

2300 D News; **2305** F Country Breakfast (rural life), A The Europeans; **2310** S-H Asia Pacific (regional current affairs); **2330** S Business Report, M The Europeans, T Rural Reporter, W The Arts on RA, H The Buzz (technology issues), F Hit Mix (pop/rock), A Innovations (new products).

RADIO AUSTRIA INTERNATIONAL

2305 S/A Insight Central Europe; **2315** M-F Report from Austria; **2325** S/A Listener Letters; **2335** S/A Insight Central Europe; **2345** M-F Report from Austria; **2355** S/A Listener Letters.

RADIO BULGARIA

2300 D News; **2310** A Views Behind the News, S Folk Studio (Bulgarian folk music), M-F Events and Developments (current affairs review); **2320** M Sports; **2325** M-F Timeout for Music; **2330** F Bulgarian Plaza (cultural magazine) or Walks and Talks (interesting places); **2335** M-F Keyword Bulgaria (Bulgaria and things Bulgarian), H Answering Your Letters; **2345** M Magazine Economy, T Arts and Artists; W History Club, H The Way We Live, F Radio Bulgaria Calling (for radio hobbyists).

RADIO CANADA INTERNATIONAL

2300 D CBC News; **2305** A Quirks & Quarks

(science), S Global Village (world music), M-F As It Happens (interviews with newsmakers)[began at 2230]; **2330** W Dispatches (world events in Canadian perspective).

RADIO ROMANIA INTERNATIONAL

2300 D Radio Newsreel; **2310** A The Week, S Focus, M-F Commentary; **0415** A World of Culture, S Sunday Studio, M Pro Memoria (history), T Business Club, W Society Today, H Cards on the Table (debate), F Challenge for the Future or Terra 21st Century [programs alternate]; **0420** A RRI Encyclopedia, M Political Flash, T European Horizons; **0425** A Roots (culture/traditions), M/W Business Update, T Tourist News, H Listeners' Letterbox, F Practical Guide; **0430** A Radio Pictures, S Romanian Itineraries, W Visit Romania, F Cultural Survey; **0435** A Romanian Itineraries, S Listeners' Letterbox, M Performing Arts, T Talking Points or Living Romania [programs alternate], W Partners in a Changing World, H Guest at the Microphone, F Over Coffee (with artists); **0440** A Bucharest Along the Centuries, M Pages of Romanian Literature, S/H Skylark (folk music), W Stage and Screen, F Off Bucharest; **0445** A DX Mailbag, M Romanian Hits, W Romanian Musicians, F Folk Music Box; **0450** S Romanian Folk Music At Its Best, M Sports Roundup, T Athlete of the Week, W Sports Club, H Football Flash, F Sports Weekend.

RADIO UKRAINE INTERNATIONAL

2300 D News; **2310** S Music from Ukraine, M-F Ukraine Today (magazine), A Ukrainian Diary (weekly review); **2315** S The Whole World on the Radio Dial (DX program); **2330** S Roots (culture & education), A Hello From Kiev (listener letters/music); **2345** M-F Closeup (current issues).

WBCQ, Maine

5105 kHz.: **2300** S Radio Reaction Theatre.
7415 kHz.: **2300** A The Real Amateur Radio Show, S Le Show (humor/entertainment), W Off the Hook (public telecommunications issues), H Goddess Irean I Music Show, F The Lost Discs Radio Show; **2330** T Duhh News, A Fred Flintstone Music Show.
9330 kHz.: **2300** A Tampon Tea Bingo Hour.

WHRA, Maine

7580 kHz.: **2305** S Turn Your Radio On (southern gospel music), M-F For the People (populist political phone-in).

WHRI, Indiana

9495 kHz.: **2330** A DXing with Cumbre.
5745 kHz.: **2330** A World Harvest Country Style.

WWCR, Tennessee

5070 kHz.: **2345** A Ask WWCR.

Thank You ...

Additional Contributors to This Month's Shortwave Guide:

Rich D'Angelo, *NASWA Flash Sheet*; Glenn Hauser, Enid, OK, *DX Listening Digest*, *World of Radio*; Jose Jacob VU2JOS, India; Anker Petersen, *DX Window*; Harold Sellers, Canada, *ODXA/DX Ontario*; Adrian Sainsbury, Radio New Zealand Intl; Klaus Schneider, Germany; Larry Van Horn, MT Asst. Editor; *BBC On Air*; *BCL News*; *BCDXC*; *CIDX*; *Cumbre DX*; *DX News*; *Fineware*; *Hard Core DX*; *NASWA Journal*; *Observer*; *Worldwide DX Club*.

Military Frequency Spectrum Holes

Over my many years of monitoring the radio spectrum I have developed a somewhat greater fascination with what is *not* being heard than with what *is* being heard in a given frequency range.

Confused? Then let me explain what a spectrum hole is.

In order to reduce interference in the radio spectrum, frequency managers develop a band plan which, among other things, indicates who owns or is allowed to use a particular frequency, and establishes the interval (spacing) between each frequency.

Once the spacing interval is set in a given band plan, any of the frequencies authorized in that plan that has no agency assignment in the official records nor any reported activity by monitors is considered a frequency "spectrum hole."

225-400 MHz

For instance, for many years in the 225-400 MHz military aircraft band the interval between frequencies was 100 kHz. Several years ago that spacing was changed to 25 kHz (increasing the number of frequencies for use by the military by a factor of four). So now, instead of only 1750 frequencies in use within the military aircraft band, we have 7000 frequencies on which to look for activity.

Federal agencies make extensive use of the 225-400 MHz band for aeronautical mobile operations. This band is used primarily for military functions, including air-ground communications and Air Traffic Control (ATC) for military aircraft. The Federal Aviation Administration (FAA) provides ATC functions for military aircraft which are essentially identical to the ATC communications conducted in the civilian VHF aircraft band (108-137 MHz). In fact, in most areas the FAA transmits ATC information simultaneously on VHF and on UHF channels so that military aircraft not VHF-equipped remain aware of civilian aircraft, and vice versa. Military uses include, but are not limited to, coordination of in-flight refueling, vectoring of aircraft to targets, and large scale training exercises. Military ATC (i.e., ground control, approach control, training flights, combat, etc.) typically use UHF exclusively. The FAA, Air Force, Army and Navy account for nearly all of fixed and mobile spectrum use in this band.

Back in the days when the 255-400 MHz band was spaced at 100 kHz as mentioned above, I had several frequencies that never had any activity reported and no assignment on them in official files. These were dubbed by radio hobbyists as "spectrum holes." At the present time, 43 of these

mystery frequencies remain that have never had activity on them. Here are those 100 kHz milair spectrum holes:

225.200	230.600	237.100	240.400
242.800	243.100	243.700	246.100
246.400	246.600	246.900	247.100
252.300	252.600	256.100	293.300
293.900	298.200	316.000	316.600
322.200	336.700	345.300	345.700
364.400	370.800	371.300	372.400
373.200	374.600	378.700	382.300
387.600	390.700	391.300	391.400
391.600	392.300	392.400	392.700
396.400	398.300	399.900	

I hope you *MT Milcom* readers will plug the frequencies above into a bank in their scanner and let us know what you hear.

138.0-150.8 MHz

Another popular military frequency range to explore is the non-tactical land mobile bands from 138.0 to 150.8 MHz (less the two meter ham band). Up until 1998 those frequencies were spaced at 25 kHz intervals. By the end of this year all land mobile systems in this band will have to utilize equipment capable of 12.5 kHz spacing. We believe that the air mobile communications authorized in this portion of the spectrum will continue to use 25 kHz spacing.

The result of all of this is that now, as government agencies purchase new radio systems, they are authorized to use these new frequencies with narrower spacing, which in effect doubles the amount of users in a particular spectrum.

Reorganizing the Land Mobile Spectrum

In the fall of 1992, Congress requested that National Telecommunications and Information Administration (NTIA) develop and implement a plan for Federal agencies to use wireless technologies that are at least as spectrum efficient and cost effective as readily available commercial mobile radio systems. In response, NTIA began its efforts by analyzing the current Federal land mobile infrastructure with respect to spectrum efficiency and cost effectiveness. NTIA selected 12.5 kHz channel width for this rechanneling, and as of this writing the government land mobile bands are being converted over using the following time line.

Narrowband (12.5 kHz) Transition Dates:

138.0-150.8 MHz (less 144-148 MHz 2 meter ham band)

New systems must use the new 12.5 kHz channel spacing as of January 1, 1995

Existing systems must be converted by January 1, 2005

162.0-174.0 MHz

New systems must use the new 12.5 kHz channel spacing as of January 1, 1998

Existing systems must be converted by January 1, 2008

406.1-420.1 MHz

New systems must use the new 12.5 kHz channel spacing as of January 1, 1995

Existing systems must be converted by January 1, 2008

So what does this mean for you, the military/federal monitoring buff? From this moment forward you need to be scanning the bands above using 12.5 kHz and you need to do it on a regular basis looking for new activity in your area. In addition, you need to seriously consider the purchase of one of the new APCO-25 digital capable scanners. This will allow you to monitor those agencies utilizing APCO-25 digital technology in conjunction with the new narrowband spacing.

From the radio hobbyist point of view, until a particular band has been fully populated using these new spacing requirements and those users have been fully identified, there will be quite a few of the newer splinter frequencies whose ownership and local activity status is unknown. These unpopulated splinter frequencies also qualify as "spectrum holes."

HF Military Spectrum Holes

The VHF/UHF government spectrum isn't the only place where spectrum holes occur.

Over 90 percent of the Federal HF spectrum use is accounted for by the Air Force and Navy. The Department of Defense (DoD) uses the HF band for a variety of functions, including but not limited to, tactical air-ground communications,



Air Force Maj. Jim Shaw banks his F-15D Eagle as he looks for opposition aircraft while flying a training mission.

command and control communications, and for communications supporting disaster relief operations. HF communications is the only communications means available between DoD aircraft transiting oceanic regions and many continental land masses lacking in other modes of communications.

Some specific examples of HF aeronautical mobile service spectrum include National Aeronautics and Space Administration (NASA) support of the space shuttle operations. The U.S. Air Force uses HF for their global command and control stations, flight testing, tactical communications, data coordination and satellite recovery operations. The U.S. Navy utilizes the HF aeronautical mobile spectrum for close air support, tactical support for anti-submarine warfare communications, and training.

◆ HF History Revisited

In my February 1995 *MT Utility World* column, we made a historic announcement that major changes were occurring in a portion of the spectrum used by the military to conduct aeronautical communications. In something akin to the rechannelization of the VHF/UHF military spectrum noted above, the portion of the HF spectrum set aside for military aviation communications was standardized to 3 kHz spacing between frequencies. The following text is from that February 1995 column:

In 1992, a World Administrative Radio Conference (WARC) was conducted by the International Telecommunications Union (ITU) in Malaga, Spain. Diplomats from around the world gathered at this conference to establish the rules and regulations that govern the radio frequency spectrum.

At the time, all of us that listen in the utility bands overlooked an appendix in the final acts of WARC 92 that made a significant change to the shortwave spectrum. This conference finally channelized the one remaining aeronautical sub-band not previously addressed in previous WARC conferences.

For the folks new to the ute world, the aeronautical bands located in the high frequency spectrum is divided into two distinct sub-bands. The first sub-band is most familiar to HF aviation buffs – the R or routed frequencies. This sub-band has communications associated with aircraft (civilian and military) that are flying on established aeronautical routes anywhere in the world. Communications in these frequencies consist of air traffic control, weather information, and private airline company traffic. The routed sub-band was rechannelized several years ago and spacing was established at 3 kHz between frequencies at an earlier WARC conference.

The other aeronautical mobile sub-band traditionally has been more obscure to all but military monitors. Dedicated readers to the yearly *Klingenfuss Guide to Utility Stations* books will recognize the term “off-route” or OR. Military listeners have prowled the OR sub-bands for years listening to the heavy concentration of military aeronautical traffic that occurs in them. The military does a lot more off-route flying than the civilian aviation population.

In the final acts of WARC 92, Appendix 26, the aeronautical mobile OR frequencies were channelized and standardized to a spacing of 3 kHz like its civilian cousin, the routed frequencies. Administrations had until December 15, 1997, to implement this change. In the middle of November 1994, something happened to change all that. One source that I talked to said that NATO and European military officials decided to implement the change early. The results of only one region implementing this change would be chaotic. The rest of the world would have to execute their changes as well.

On November 10, 1994, the *SPEEDX Utility Notes* editor Richard Baker and *MT Utility World* column regular, Jeff Haverlah, both noted that US Coast Guard air to ground frequencies in the OR sub-bands appeared to have changed frequencies. We concluded at this point that something was obviously up, we just didn’t know what for sure. While it looked like a change to standard channel

spacing was being attempted by these agencies, the two biggest users in this part of the world, the U.S. Air Force and U.S. Navy, had not changed their frequencies.

The big break came on December 22, 1994, when the Global HF System or GHFS changed to their new OR frequencies. Listening to the GHFS frequencies on that evening was indeed a treat to all those that participated.

The frequency ranges that were affected by this change are:

3025 - 3155 kHz	43 + 1 channels (3023 is used for worldwide common use)
3900 - 3950 kHz	16 channels (Used in ITU region 1 only)
4700 - 4750 kHz	16 channels
5680 - 5730 kHz	15 + 1 channels (5680 is used for worldwide common use)
6685 - 6765 kHz	26 channels
8965 - 9040 kHz	25 channels
11175 - 11275 kHz	33 channels
13200 - 13260 kHz	20 channels
15010 - 15100 kHz	30 channels
17970 - 18030 kHz	20 channels

Since the time of that column, monitors have carefully scanned the aero OR frequencies for activity and almost three-quarters of the frequencies have been determined to be active. But we still have 70 frequencies which remain a mystery. We invite our *MT* readers to let us know what you are hearing on the following HF aero spectrum holes.

Region 1 Off Route spectrum holes

3903	3906	3909	3912	3915	3918
3921	3924	3927	3930	3936	3939
3942	3945				

US Air Force

3059	3062	3065	3080	3140	6709
8986	9013	11238	13248	15037	15040
17997	18030				

US Coast Guard

4730	4733	6742	8983	11196	13221
15082	15085	15088	17988		

US Navy

3035	3050	3083	3086	3098	3104
3152	4712	4715	5723	6703	8995
11193	13230	13239	13251	15019	
15022	15028	15052	15055	15058	
15061	15064	15067	15070	15076	
15079	17970	17979	17985	18015	

And that will do it for this month. Whether you prowled the HF bands or VHF/UHF spectrum for military activity, you have some new territory to explore if you use the information provided in this month’s column. Be sure to let us know what you are hearing. In future editions of this column we will pass along additional UHF military aircraft band spectrum holes. It will take us some time and space to do this, so please be patient. Until next time, 73 and good hunting.



An F/A-18 Hornet launches towards the sun from the flight deck of the aircraft carrier USS Constellation.

Video Piracy

by David Lawson

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Lingo of the Rails

It's an unusual language. The language, or lingo, of railroaders differs much from that which is heard on the public service bands.

The police and fire channels have 10-codes such as 10-7 and 10-8 for being in and out of service, and also many departments use signal codes for responses. The railroad police, or special agents, also use these codes and signals, since they are commissioned police officers. But the lingo of the railroaders usually differs – not only from 10-codes, but also from company to company.

◆ Become familiar with the railroads

Familiarizing yourself with the various locations on the railroad and the specialized terms the railroaders use can be very helpful in finding trains. Trying to learn the language comes in handy when listening to railroad conversations. Many words and terms are local terminology or geography and others are specialized to the railroad itself.

◆ Train orders

Train orders are often read over the air to the train crews by the dispatcher. The dispatcher may tell the crew to *check box three* – words that could mean any number of things to the new listener. In this case, it means exactly what he says: it's the instruction to the conductor on the train to place a check mark in box number three on his train order sheet. The train order that is given will then grant the rights for movement over certain trackage. Listen carefully to what is said with regard to locations.

◆ Rail Talk

Talk about the *Pig's Tail*, the *Snake Track*, *Four Mile* and the *Early Bird* will be heard when you're listening to the rail frequencies in both Elkhart and Fort Wayne, Indiana, on the Norfolk Southern. Knowing the nicknames for these various locations on the railroads assists in finding trains. Spencerville, Saint Joe and Grabill siding are named for actual locations that can be found on the Indiana State map.

Many other railroad abbreviations come from the time when Morse Code was used for the towers and sidings; i.e. "*JK*" is the junction between the CSX and Norfolk Southern at Saint Joe, Indiana. The CSX crews call this junction either Saint Joe or "*JK*", while the Norfolk Southern crews call it Saint Joe.

Adams and *Junction* are names of old interlocking towers on the former Pennsylvania Railroad line through Fort Wayne, Indiana. The actual towers were removed years ago, but the names still exist. *Hill* and *Sand* are control points which were added a few years ago and never existed before right-of-way restructuring occurred in Fort Wayne.

Highball!

The dispatcher may tell the crew of train #411 to *highball*! Highball does not mean that the crew is allowed to drink alcoholic beverages while on duty! (This would be in violation of, typically, Rule G on many railroads.) The term "Highball" comes from a historic track signal, where a ball was hoisted in the air on a pole to indicate the track ahead of the train was clear for passage. A

lowered ball meant a train was ahead and to stop and wait for clearance. Many railroads still use this old expression when signaling a train for departure.

Defect detectors

Knowing various Mileposts (MP) and Control Points (CP), on the railroads comes in handy, as does recognizing junctions, sidings and yard names, while monitoring rail radio traffic. *MP 360.5* on the Norfolk Southern's New York-to-Chicago mainline has a talking *hot box detector* (HBD) west of Butler, Indiana, which monitors the passing trains for defects. This HBD speaks on the 160.800 MHz road channel and gives the crew the condition of their passing train.

CSX's double-tracked Chicago-to-Willard, Ohio, mainline has an HBD at MP 121.0 broadcasting on radio frequency 160.230 MHz. This "talker" announces the train's speed, track number and the number of the cars in the train's *consist* (manifest of cars), and whether a defect exists. HBD and *dragging equipment detectors* (DED) on other railroads will announce the train's direction and the temperature, too.

One term the Norfolk Southern uses is *RWIC* and a person's name. The first time I heard *RWIC Dize* at Grabill, I hurried and drove to the siding expecting a train, but instead found a hi-rail truck. A hi-rail truck is a standard pickup with steel flanged wheels that can be lowered onto the track to guide the vehicle. I soon realized that *RWIC Dize* was a Right-of-Way Inspection Car with Mr. Dize as the driver.

Motors?

Locomotives on the railroads are typically called engines, but the CSX crews call their locomotives "*motors*," as do other railroads. Listening to the particular terms of each railroad helps in understanding the operations of that railroad.

Mobile telephones

Railroads use mobile telephone systems along with cellphones for communications today. The mobile telephone system on the Norfolk Southern is called the *ARN*, or Area Radio Network. Each railroad has a different acronym for their mobile telephone systems, which you will recognize after listening for a while to the "lingo" of the railroads in your area.

Lunar light?

Westbound Norfolk Southern trains heading toward East Wayne Yard in New Haven, Indiana, sometimes stop at the *lunar light* to wait



A Norfolk Southern westbound heads past me this frigid afternoon as led by two ex-Conrail engines.

clearance into the yard. You may wonder how the train crews see the light from the moon when it is cloudy or daytime!

The lunar light is just the name for the bright white signal at West New Haven pass and is called such, since it appears white like the light from the moon – thus lunar. Every railroad has terms that are meaningful to the railroad, but not obvious to the casual railroad listener. Sometimes a drive along the tracks (without trespassing) can be helpful in deciphering the meaning. Take your scanner along, if lawful, to listen to the railroad communications trackside.

For example, just as West New Haven Pass is the name for the passing siding that exists in New Haven, hearing “Dawkins” on the radio means that a train is at Dawkins Pass several miles east of New Haven. Dawkins Pass is where the trains switch radio frequencies from Road channel 161.250 MHz heading west to the Terminal channel 160.380 MHz, and vice versa.

Cabooses

Cabooses are almost non-existent today, except for use in terminal areas and on switching runs. Cabooses are also referred to as *vans*, *cabs*, *way cars*, *hacks*, or *cabin cars*. Today these cars, which used to carry the conductor and rear-end brakeman, have been replaced by the EOT, or end-of-train device.

These EOTs have a flashing red lamp and a radio to transmit the air pressure reading for the brakes to a receiver in the cab of the lead locomotive. Railroad enthusiasts (or railfans as we are called) commonly refer to these EOTs as FREDs. FRED is short for “Flashing Rear-End Detector.”

The radio signal from an EOT can also be useful for finding trains. In railroad territories, where the engineer does not voice repeat the signal indications of trackside signals like on the Norfolk Southern and CSX, the digital squawk heard from the EOT can signal that a train is nearby. The EOT, or ETM (end-of-train monitor), usually transmits a low-power signal on 457.9375 MHz, which is a UHF (ultra high frequency) channel. The Norfolk Southern typically uses VHF (very high frequency) channel AAR (Association of American Railroads) Channel 67, which is 161.115 MHz.

Today's Trains

Various types of freight cars make up the consist, which is the equipment assembled in a train's manifest. TOFC is short for a *trailer on flat car*. Pig trains are *piggyback* or TOFC consists, and are normally expedited trains on the mainline railroads. COFC is the abbreviation for a *container on a flat car*.

Stack trains consist of containers on specialized cars loaded with goods mostly from foreign nations. These containers arrive from across the oceans by cargo ships and are unloaded at huge container terminals at east and west coast seaports. Whole trains of these containers will travel in special trains to yards near Chicago and other large cities for unloading. These containers are placed onto specialized trailers for transport to the customer. Hundreds of containers can be hauled by one train for great distances and then



A Norfolk Southern train with Union Pacific power awaits the signal to head through NE Junction in New Haven, Indiana.

by tractor truck for the terminal delivery.

My buddy John Reitz and I found a west-bound train in the Grabill passing siding today. He was awaiting the passing of #196 heading eastbound. The burley conductor ambled down from the cab of the engine and proceeded to do a “roll-by inspection” of #196. After #196 rolled by, the conductor on the ground radioed to the engineer of #196 that “he was looking good!” The engineer on #196 radioed back, “Thanks for the report, but how does my train look? I know I look good!”

Sometimes the language used by the railroaders can be a little vulgar. The life of a modern railroader is rough and the language can be a little rough at times, too. Each railroad has rules for using the radios, but these rules seem to be bent a little from time-to-time.

I can remember one night when a dispatcher friend of mine was a little short with a crew which refused to listen to his exacting order. My friend finally just told them to do what he said in no uncertain terms and that was it! Communications ended!

We'll continue with more on “lingo of the railroads” in future columns.

New Radio Frequencies

Larry Waggoner of Wichita, Kansas, emailed a copy of the radio frequency card given him by the crew on the Grand Canyon Railway. The Grand Canyon runs both steam and diesel excursion trains from Williams, Arizona, to the Canyon's edge. Larry took the ride on a vacation last year. The GCRY radio frequencies are:

161.565 MHz	Dispatch repeater (1&2)
160.485 MHz	Switching (3)
160.830 MHz	Maintenance of Way (4)
157.680 MHz	Administrative (5)
160.350 MHz	Train Crew

Dale Rothert sends along the radio frequencies for the regional railroad, Wheeling and Lake Erie Railway in Ohio, and also for the shortline, Ohio Central.

W&LE Railway

161.025 MHz
161.250 MHz

Road and dispatcher
Secondary channel

Ohio Central Railway

160.215 MHz	General Operations
160.845 MHz	Repeater (Output)
160.215 MHz	Repeater (Input)

We welcome your railroad radio frequencies – new and old – for publication in this column to share with other readers. Please feel free to email news concerning radio communications on the railroads and also verified radio frequencies for publication. Please be sure to send accurate listings, so we do not pass along data with errors.

Happy train hunting!

Race Scanning

Race Scanning



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- What you can hear
- Racing terms
- Racing flags
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IBOC Implementation Update

The development every DXer loves to hate is taking another turn this month... *Radio World* is reporting that the National Association of Broadcasters (NAB) wants interim authority for AM stations to use IBOC digital radio at night. Last year, the FCC adopted a notification procedure, allowing stations (both AM and FM) to begin digital broadcasts at will, provided a letter is filed within ten days notifying the Commission of the move. The procedure states that IBOC operation is only permitted during daytime hours (then, confusingly, suggests that stations authorized to operate in analog at night may operate IBOC between 6am and 6pm...)

WOR-710 New York and WSAI-1530 Cincinnati have run some nighttime IBOC tests under special temporary authority, tests that have led to severe interference to DX signals. The NAB says "The dramatically improved audio quality from IBOC service at night is well worth the predicted and limited reductions in analog coverage."

Bad News All Around?

Obviously, this is not good news for the DXer. DXers believe the widespread adoption of IBOC will limit the coverage of the 50,000-watt clear channel stations to their own metropolitan areas; the extended regional coverage of stations like WSM-650 will be lost. Smaller regional- and local-channel stations would suffer even greater reductions in usable coverage. Broadcasters seem to agree – many saying that stations can't sell advertising outside their metropolitan areas, so they really *don't care* if they lose their outlying coverage. (Others aren't sure their colleagues realize just how much coverage they may be losing...)

I'm not personally convinced it will get that far. The Ibiquty equipment is not cheap. Many directional stations will need to make expensive adjustments to their antennas before they can broadcast in digital. Many AM stations are just barely capable of paying the bills – an optional IBOC encoder (and the engineering time to install it) will be out of the question. A table on the NAB website indicates 272 AM stations went permanently silent between 1992 and 2001.

I think that's a pretty good indicator of how much money there is (isn't!) in small-market AM. My prediction is that IBOC will be rare on the regional and local channels. The clear channels where we hear the most exotic

DX today will fill up with interference – and the best DX will be on the frequencies that are *least* DXed today.

IBOC's First Customer

On January 5th, Nathan Franzen of Cedar Rapids, Iowa, became the first consumer to purchase an IBOC radio. The radio, a Kenwood KTC-HR100, was installed in Franzen's car and used to listen to top-40 station KZIA-102.9. According to the FCC's database, KZIA is the only IBOC station in Cedar Rapids ... so I hope Mr. Franzen really likes top-40<grin>!

IBOC ("HD Radio") promoters really hyped this event. Ibiquty managed to get a quote from the mayor of Cedar Rapids. And much was made of past developments in radio technology by a local Cedar Rapids firm, Collins Radio. (It may be of interest that nobody from Collins commented.) The article doesn't say how much Franzen paid for his radio, nor whether it will also tune IBOC AM stations.

DXers are reporting two more major stations with IBOC. WBZ-1030 Boston and KCBS-740 San Francisco are both reported testing with digital, so far only during the day. See the sidebar for a list of 50kW clear-channel AM stations authorized for IBOC as of the beginning of February.

◆ Bits and Pieces

Legal and Illegal Intruders: Another source of interference are new stations in Mexico. A station appeared in the Tecate area of Baja California on 550 around the first of the year. KFYI in Phoenix and KUZZ Bakersfield both suffered severe interference. The station then moved to 560 – much better for KFYI and KUZZ but a problem for KBLU-560 in Yuma.

Then, there are pirates. An unlicensed FM station appeared in Brattleboro, Vermont, in 2003. In late June, the FCC closed the station – and in late August it returned. According to a Troy, NY, *Record* report forwarded by Chuck Porter, Radio Free Brattleboro believes 2,000 signatures in support of the station from local residents constitute legal authority to operate. (I have my doubts the FCC and federal courts would agree!)

TIS Proliferation: Kraig Krist KG4LAC has another batch of Travelers Information Station (TIS) loggings. Stations heard at his northern Virginia location include WTEZ462-530 at National Airport; WPBJ590-590 in Montgomery County, Maryland; KJI955-1640; and two that weren't giving calls – one on 1650 with

out-of-date Washington, DC, traffic alerts and another on 1660 simulcasting the Manassas Weather Service 162MHz weather radio. KJI955 is being reported across much of the East Coast, but nobody's yet been able to figure out where it is! – It's not in any of the online databases. In the regular stations department, Kraig also logged WJAS-1320 Pittsburgh. This station (and KQV-1410) are frequent reception here in Tennessee as well.

Arnal Cook has been shooting pictures of several TIS stations in Indiana. The station in the picture is signing WT2339605 (a rather strange callsign, even for a TIS!) on 530kHz near Kokomo. Note the unusual design of the antenna. By comparing it to the building in the background, you can tell it's probably only about 30 feet tall. FCC regulations would require the tower of a regular (non-TIS) station on 530 to be 95 meters – over 300 feet – in height.

The loops at the top of the antenna (along with four radial wires that don't show up in the picture) form a "capacity hat" which causes this antenna to be more efficient than its short design would otherwise be. Note also the grey box behind the antenna – this box contains the transmitter. Obviously, low-power TIS transmitters are much smaller than those used at full-powered stations!

Write me at 7540 Highway 64 West, Brasstown NC 28902-0098, or by email to dougsmith@monitoringtimes.com. Good DX!



WT2339605-530, a TIS near Kokomo, Indiana

50kW clear-channel IBOC stations

KCBS-740	San Francisco
KNX-1070	Los Angeles
KTNQ-1020	Los Angeles
KXNT-840	Las Vegas
WBZ-1030	Boston
WOR-710	New York
WSB-750	Atlanta

Radio Free Brattleboro vs. FCC

One of the most interesting pirate radio stories of 2004 has been the ongoing battle between the FCC and **Radio Free Brattleboro** in Vermont. This unlicensed station openly operates on 107.9 MHz FM in Brattleboro. They also maintain a web site at <http://www.rfb.fm/> on the internet, where they sometimes broadcast an internet stream simulcast of their over the air broadcast. FM DXers who are lucky enough to hear this one can send their reception reports to Radio Free Brattleboro, PO Box 1941, Brattleboro, VT 05302.

The station views itself as a community radio station in Brattleboro. Programming is a mix of public affairs shows and a diverse collection of musical styles, with an emphasis on local programming. But, given the fact that the station is unlicensed, the FCC has been sending correspondence to the station with threats that they may be closed down.

Interestingly, the station and many Brattleboro citizens have been resisting the FCC's investigation. In fact, on March 2, local voters will vote in a referendum on whether or not **Radio Free Brattleboro** should be allowed to remain on the air. This referendum is a response to a petition drive that was started in Vermont. The text of the petition was: "We, the undersigned registered voters of Brattleboro, Vermont, request that the following advisory question appear for vote by Australian ballot on the Town Meeting Ballot at the March 2, 2004 election:

"Shall the voters of Brattleboro give to radio free brattleboro (rfb) authority to broadcast until such a time that a Low-Power FM license is issued to radio free brattleboro or to another non-profit, locally-based, community group which is prepared to offer to the Town of Brattleboro diverse, all-access, non-commercial, community radio?"

This unusual controversy continues to be breaking news at this time. You might want to check the station's web site for the latest details in the battle between Brattleboro, Vermont, voters and the Federal Communications Commission.

The issue of local low power broadcasting was obviously not resolved by the FCC's protracted and agonizing process for setting up Low Power FM stations in the United States. Literally hundreds of other low power pirates continue to operate across the United States, with a noted concentration of them in Florida.

◆ Unusual QSL

Last month we mentioned a variety of unusual pirate radio QSLs in this column. In response, our readers frequently mentioned the all-time champion in unusual pirate QSL lore. **Spam**

Radio, a currently inactive pirate station, crossed every line in the book with the QSL that we see a portion of this month. Postal regulations and plain common sense prohibit us from printing the entire Spam Radio QSL in this magazine. Last month we indicated that we could not discuss this QSL in *Monitoring Times*, but given popular demand, we show the logo from this notorious QSL here this month.



The rest of the QSL showed perverted activities by the woman in the photo and an unidentified man. The photo was so disgusting that many DXers discarded the copies of the QSL that arrived in their mailboxes. Other DXers had some explaining to do when their spouses and/or children opened the mail to discover this QSL.

Almost all pirate QSLs do not fit this horrible description, so most of us don't have to worry about unpleasant experiences like this. But, the **Spam Radio** QSL incident was certainly an example of creativity in the unlicensed broadcasting field, even if in this case it ended up being creativity gone bad.

Of course, unseemly activity has not been limited to pirate broadcasting stations this year. Virtually everyone has now heard about the half-time incident at the NFL Super Bowl when portions of singer Janet Jackson's costume were "accidentally" removed on CBS Sports nationwide television. The FCC has decided to spend taxpayers' money to launch a formal investigation of this event. Interestingly the MTV web site posted the following promotional announcement on the day before the Super Bowl: "Janet Jackson's Super Bowl Show Promises 'Shocking Moments.'"

Several *MT* readers wrote in this month to talk about the incident where **WKBN-TV's** Youngstown, Ohio, news anchorwoman Catherine Bosely decided to resign after nude photos of her appeared on the internet, taken while she danced in Key West, FL. It is clear that poor taste is not limited only to pirate radio stations. But, from time to time, pirate radio fare can be even racier than the notorious incidents on licensed broadcasters in 2004.

◆ Clandestine Radio com

Martin Schoech has announced that **Clandestine Radio com** has revamped its literally phenomenal web site that covers political clandestine broadcasting on a worldwide basis. If you have

been looking for this absolutely vital resource, you need to check out its new location at <http://www.clandestineradio.com> on the internet. Martin also operates an interesting web site about QSLs, both from clandestines and from other broadcasters. You may want to check out this interesting radio resource at <http://www.schoechi.de/qip.html> on your internet dial.

◆ Europirate Frequencies

During the early part of 2004 there have been quite a few confirmed loggings of European pirate stations in North America. Recent broadcasts that made it across the ocean to North America were Cupid Radio from the Netherlands on 21894.8 kHz, Radio Casanovas from the Netherlands on 6265 kHz, Radio Alpha Lima International on 15070 kHz, European Music Radio on 9290 kHz, Radio Omroep Zuid from the Netherlands on 21890 kHz, Radio Spaceman from the Netherlands on 3927 kHz, Laser Hot Hits from the UK on 8219 kHz, and an unidentified station on 6267 kHz. These frequency ranges are worth a bandscan during weekend evenings when propagation is appropriate between Europe and North America.

◆ What We Are Hearing

Our readers heard all of these North American pirate broadcasters this month, with apparently somewhat reduced volumes of shortwave pirate broadcasting lately. All pirates operate on a sporadic schedule, but shortwave pirate broadcasting increases noticeably on weekends, and during major holiday periods. You have to tune your dial through the pirate radio band to find the stations, but the new main North American pirate frequency of 6925 kHz, plus or minus 30 or 40 kHz is the place to scan for the pirates. The old 6955 and 6950 kHz frequencies are increasingly abandoned by pirates because of interference from licensed stations, but there are occasional broadcasts there.

Big Thunder Radio- The young boy who serves as the announcer on this station hosts rock music programming. (Uses bighthunderradio@yahoo.com e-mail)

Border Radio- This station is primarily a comedy operation. (None)

Grasscutter Radio- This was a new pirate last year, but by now they are almost a veteran with discussions of pirate radio and rock music. (Uses grasscutterrado@yahoo.com e-mail)

KIPM- The existential dramas on Alan Maxwell's station have been heard on a nationwide and worldwide basis from what appears to be a powerful transmitter. (Elkhorn)

Radio FCC- It is extremely doubtful that the Federal Communications Commission is actually responsible for this oldies rock pirate. (none)

continued on page 75

SATELLITE SERVICES

MT TRANSPONDER GUIDE www.monitoringtimes.com/mtssg.html

All Frequencies MHz

Robert Smathers

robertsmathers@monitoringtimes.com

Satelites Mexicanos SATMEX-5

C-band - 116.8 degrees West longitude

1(V)	3720	Data Transmissions
2(H)	3740	Data Transmissions
3(V)	3760	Data Transmissions
4(H)	3780	Data Transmissions
5(V)	3800	PCTV - Television Por Cable (digital)
6(H)	3820	Data Transmissions
7(V)	3840	PCTV - Television Por Cable (digital)
8(H)	3860	Data Transmissions / CB Television (digital)
9(V)	3880	Data Transmissions
10(H)	3900	Data Transmissions
11(V)	3920	Data Transmissions / Canal 11 Sotel (digital) / Sports Book (digital)
12(H)	3940	De Pelicula Clasico USA, Telehit, Ritmoson, Telenovelas, Golden I, Golden II, Unicable, De Pelicula, Bandamax, XEW-TV Canal 2, Telehit USA, De Pelicula USA, Ritmoson USA
13(V)	3960	TV Azteca, Azteca America (digital)
14(H)	3980	Data Transmissions
15(V)	4000	Teve-De-Mente (digital) / RGT (digital) / XEIMT-TV Canal 22 (digital) / XHAW-TV Monterrey (digital) / XHSAW-TV Monterrey (digital)
16(H)	4020	Occasional video
17(V)	4040	Data Transmissions / VideoRola (digital)
18(H)	4060	Mexico City services (digital) Canal del Congreso XEIPN-TV Canal Once Gobierno de la Republica feeds
19(V)	4080	Telefe International (digital)
20(H)	4100	Data Transmissions / NotiColombia (digital) / Guatevision (digital)
21(V)	4120	MVS Television Empresarial (digital)
22(H)	4140	Data Transmissions / XHAOX-TV Oaxaca (digital)
23(V)	4160	PCTV - Television Por Cable (digital)
24(H)	4180	Edusat (digital)

Satelites Mexicanos SATMEX-5

Ku-Band - 116.8 degrees West longitude

1(H)	11720	Data Transmissions
2(V)	11740	Data Transmissions
3(H)	11760	Data Transmissions
4(V)	11780	Data Transmissions
5(H)	11800	Data Transmissions
6(V)	11820	Data Transmissions
7(H)	11840	Data Transmissions
8(V)	11860	Data Transmissions
9(H)	11880	Data Transmissions
10(V)	11900	Data Transmissions / Occasional video
11(H)	11920	Occasional video
12(V)	11940	Data Transmissions
13(H)	11960	Data Transmissions
14(V)	11980	Data Transmissions
15(H)	12000	Data Transmissions
16(V)	12020	Data Transmissions
17(H)	12040	Data Transmissions / El Sembrador Nueva Evangelizacion (digital) / Almavision (digital)
18(V)	12060	Data Transmissions
19(H)	12080	International services (digital) Power TV, TV Polonia, Tzu Chi, CCTV-4, Mac TV, ATV, Hwazan, ERA News, Azio TV, Senal Colombia, two Colombian radio services
20(V)	12100	Data Transmissions
21(H)	12120	Data Transmissions
22(V)	12140	Data Transmissions / Occasional video
23(H)	12160	Data Transmissions / Latter Day Saints (LDS) Television - Mexico feed (digital)
24(V)	12180	Sistema Tecnologico de Monterrey (digital) / Universidad Virtual Empresarial (digital)

Telesat Canada Anik E2

C-Band - 118.7 degrees West longitude

1A(H)	3720	Inactive transponder
1B(V)	3740	Occasional video
2A(H)	3760	Occasional video
2B(V)	3780	Occasional video
3A(H)	3800	Occasional video
3B(V)	3820	Occasional video
4A(H)	3840	Occasional video
4B(V)	3860	Occasional video
5A(H)	3880	Occasional video
5B(V)	3900	Occasional video
6A(H)	3920	Occasional video
6B(V)	3940	Occasional video
7A(H)	3960	Inactive transponder
7B(V)	3980	Occasional video

8A(H)	4000	Occasional video
8B(V)	4020	Occasional video
9A(H)	4040	Occasional video
9B(V)	4060	Inactive transponder
10A(H)	4080	Occasional video
10B(V)	4100	Occasional video
11A(H)	4120	Occasional video
11B(V)	4140	Occasional video
12A(H)	4160	Occasional video
12B(V)	4180	Inactive transponder

Telesat Canada Anik E2

Ku-Band - 118.7 degrees West longitude

T01(V)	11717	Occasional video
T02(V)	11743	Occasional video
T03(V)	11778	Occasional video
T04(V)	11804	Occasional video
T05(V)	11839	Occasional video
T06(V)	11865	Occasional video
T07(V)	11900	Occasional video
T08(V)	11926	Occasional video
T09(V)	11961	Occasional video
T10(V)	11987	Occasional video
T11(V)	12022	Occasional video
T12(V)	12048	Occasional video
T13(V)	12083	Occasional video
T14(V)	12109	Occasional video
T15(V)	12144	Inactive transponder
T16(V)	12170	Inactive transponder
T17(H)	11730	Occasional video
T18(H)	11756	Occasional video
T19(H)	11791	Occasional video
T20(H)	11817	Occasional video
T21(H)	11852	Occasional video
T22(H)	11878	Occasional video
T23(H)	11913	Occasional video
T24(H)	11939	Occasional video
T25(H)	11974	Occasional video
T26(H)	12000	Occasional video
T27(H)	12035	Occasional video
T28(H)	12061	Occasional video
T29(H)	12096	Occasional video
T30(H)	12122	Occasional video
T31(H)	12157	Inactive transponder
T32(H)	12183	Inactive transponder

Loral Skynet Telstar 13

121 degrees West longitude

1(H)	3720	Occasional video
2(V)	3740	Occasional video
3(H)	3760	Occasional video
4(V)	3780	Occasional video
5(H)	3800	Occasional video
6(V)	3820	Occasional video
7(H)	3840	Occasional video
8(V)	3860	Occasional video
9(H)	3880	Occasional video
10(V)	3900	Occasional video
11(H)	3920	Occasional video
12(V)	3940	Occasional video
13(H)	3960	Occasional video
14(V)	3980	Occasional video
15(H)	4000	Occasional video
16(V)	4020	Occasional video
17(H)	4040	Occasional video
18(V)	4060	Occasional video
19(H)	4080	Occasional video
20(V)	4100	Occasional video
21(H)	4120	Occasional video
22(V)	4140	Occasional video
23(H)	4160	Occasional video
24(V)	4180	Occasional video

Echostar Communications Echostar-IX

Ku-Band - 121 degrees West longitude

11720(V)	Dish Network (digital)
11735(H)	Dish Network (digital)
11750(V)	
11765(H)	
11780(V)	
11795(H)	
11810(V)	Dish Network (digital)
11825(H)	Dish Network (digital)
11840(V)	
11850(H)	
11870(V)	
11880(H)	Dish Network (digital)
11900(V)	Dish Network (digital)
11910(H)	Dish Network (digital)
11930(V)	Dish Network (digital)

11945(H)	
11960(V)	
11970(H)	
11985(V)	Dish Network (digital)
12000(H)	
12015(V)	
12030(H)	Dish Network (digital)
12045(V)	
12060(H)	
12075(V)	
12090(H)	
12105(V)	
12120(H)	
12135(V)	
12160(H)	
12165(V)	

Panamsat Galaxy 10R

C-Band - 123 degrees West longitude

1(V)	3720	Data Transmissions
2(H)	3740	Data Transmissions
3(V)	3760	Data Transmissions
4(H)	3780	Data Transmissions
5(V)	3800	Showtime - West, Showtime Too - West, Showtime Showcase - West, The Movie Channel - West, Flix - West, Sundance Channel - West, The Movie Channel Xtra - West, Showtime Beyond - West, Showtime Extreme - West (digital)
6(H)	3820	Data Transmissions
7(V)	3840	TVN Pay-Per-View Theaters, TEN - The Erotic Network, Pleasure (digital)
8(H)	3860	Data Transmissions
9(V)	3880	TVN Pay-Per-View Theaters, Hot Body 2, TEN Clips, TVN UrbanXtra, TVN Direct (digital)
10(H)	3900	Data Transmissions
11(V)	3920	Toon Disney - East, Toon Disney - West, Soapnet - East, Soapnet - West (digital)
12(H)	3940	TVN Pay-Per-View Theaters (digital)
13(V)	3960	TVN Direct, DMX Audio Services, TVN Pay-Per-View Theaters, Hot Body, Scorch, TVN TeleNuestros, Cable Radio Network (CRN) 1, CRN 2, CRN 3 - Talk Radio Network, CRN 4 - CSPAN Radio, CRN 5 - Radio America and i.e. America Radio Networks, CRN 6 - Langer Broadcasting/Lifestyles Radio (digital)
14(H)	3980	Showtime HDTV - West, Showtime Next - West, Showtime Family Zone - West, Showtime Women - West (digital)
15(V)	4000	Showtime - West (VC2+)
16(H)	4020	TV Land - East (VC2+)
17(V)	4040	Nickelodeon - West (VC2+)
18(H)	4060	The Movie Channel - West (VC2+)
19(V)	4080	MTV - West (VC2+)
20(H)	4100	Data Transmissions
21(V)	4120	(none)
22(H)	4140	Data Transmissions
23(V)	4160	A&E - East, A&E - West, The History Channel - East, The History Channel - West (digital)
24(H)	4180	Outdoor Channel

Panamsat Galaxy 10R

Ku-Band - 123 degrees West longitude

1(V)	11720	Occasional video
2(H)	11740	Data Transmissions
3(V)	11760	Data Transmissions
4(H)	11780	Data Transmissions
5(V)	11800	Equity Broadcasting (digital)
6(H)	11820	University of Washington TV, KEXP-FM 90.3 Seattle, WA (digital) / Data Transmissions
7(V)	11840	Data Transmissions
8(H)	11860	Data Transmissions
9(V)	11880	Occasional video
10(H)	11900	Data Transmissions
11(V)	11920	TARBS World Television: MAD TV, Alpha International, MTB - MKTV Sat, RTS, NBN World, Leonardo, VIT, TV Moda, Telepace, Syria TV, RIK TV, Nojoom TV, Radio Melodia, Radio Italia, Radio Anni 60, Radio Greece (digital)
12(H)	11940	Data Transmissions
13(V)	11960	iskycm.tv: TV Korea, SBS Korea, YTN, iskycom tv, Radio Korea, Korean Gospel Radio (digital)
14(H)	11980	Data Transmissions
15(V)	12000	California Community College distance learning (digital)
16(H)	12020	Data Transmissions
17(V)	12040	Data Transmissions
18(H)	12060	Data Transmissions
19(V)	12080	Occasional video
20(H)	12100	Data Transmissions
21(V)	12120	Equity Broadcasting (digital)
22(H)	12140	Occasional video
23(V)	12160	Occasional video
24(H)	12180	Occasional video / Jason Project (digital - occasional)

Mystery Beacon

An unidentified beacon – TRY, 263 kHz – has appeared on longwave. Cliff Watts (TX) was among the first to report this station to *Below500 kHz*. He began hearing the station in mid-January and notes that it is very strong at his Southeast Texas location. Listeners in Arizona, South Carolina, and Florida have also reported hearing TRY.

Because of where it's being heard, one theory is that TRY is a new platform beacon located in the Gulf of Mexico. Other possibilities include an intentional ID change or miskeying of an existing station. The latter scenario seems unlikely because of the clarity of the Morse ID. At this writing (early February), all possibilities remain open, so I'd like to hear from any readers who are able to hear TRY. Perhaps by coordinating the locations of listeners and signal strengths, we can come up with some answers.

◆ Thrown for a Loop

Tony Straka (PA) posed an interesting question regarding the use of AOR loop elements with his Palomar LA-1 amplifier base. Although they looked almost identical to Palomar loops, would the AOR elements be electrically compatible? An opportunity came up to purchase them in an online auction, and he decided to give it a try.

Tony was delighted to find that the loops work just fine, with only a slight downward shift in frequency coverage. As a result, he now has LF coverage from 150-450 kHz, and he finds the directionality to be a huge advantage in pulling in weak signals and nulling interference.

Tony also sent a picture of beacon NXX on 388 kHz (Figure 1), which is located at the Willow Grove Naval Air Station in Willow Grove, PA. This beacon is frequently logged in the Northeastern U.S., and uses the somewhat unusual ID pitch of 1100 Hz. Most beacons in the U.S. use a 1020 Hz pitch. The difference is not huge, but it is noticeable, reports Tony.



Figure 1. NXX/388 kHz, Willow Grove, PA – Transmitter is housed in the small shed; antenna wire is strung between the utility poles.

◆ Beacon Loggings

Alex Hagerty, KG4VXP (VA), sent along a list of loggings from the Washington DC area, which he heard using a Raytheon RAF DF-20 marine direction finding radio. DFing units make excellent receivers for longwave, and they are becoming a more common at swapmeets with the demise of maritime beacons. Another benefit to these rigs is that they contain a built-in directional antenna, and a compass scale that tells you the bearing of stations you hear.

Alex says he enjoys the *Below500 kHz* column and has placed many clippings from it in his LW DXing "cheat sheet." Welcome aboard, Alex, and we look forward to hearing from you often.

Table 1. Selected Beacon Loggings

Freq.	ID	Location
198	DIW	Dixon, NC
216	CLB	Wilmington, NC
223	DA	Ft. Belvoir, VA
237	EZF	Fredericksburg, VA
323	GTN	Washington, DC
332	DC	Washington, DC
346	IA	Washington, DC
355	CGE	Cambridge, MD
360	RW	Camp Springs, MD
363	RNB	Millville, NJ
371	FND	Baltimore, MD
385	GAI	Gaithersburg, MD

◆ ODXA Milestone

Congratulations to the Ontario DX Association (ODXA) on 30 years of service! Since 1974, this all-volunteer group has promoted the radio hobby with a focus on SW broadcasting, as well as utility, scanner, ham radio and FM/TV DXing topics. The club's journal, *Listening In* (Formerly *DX Ontario*) is a respected source of information on all fronts of the monitoring hobby.

The ODXA's roster includes many U.S. members, particularly from Northeastern states, and for good reason; The ODXA has a longstanding policy of listing only stations that have been logged in Ontario. Because of this, you can be quite certain of hearing the same stations in the Northeastern U.S.

I first learned of this club when they had a booth set up at the Rochester Hamfest back in the mid-1980s. Until this point, my radio interests had been pretty much ham-related, but the ODXA display showed me that there was more to the radio hobby, and that listening was not merely a stepping stone into

amateur radio. For more information on the ODXA, check out the club's website at: www.odxa.on.ca/.

◆ What the Others are Saying

The February issue of *The Lowdown*, journal of the Longwave Club of America, contained a useful summary of Natural Radio receivers currently available to hobbyists. Firms like LF Engineering (<http://www.lfengineering.com>) and Kiwa Electronics (<http://kiwa.com>) have offered receivers for a long time and are well known to most hobbyists, but here are a few more sources that may be of interest to MT readers:

Inspire VLF-3 Kit, <http://image.gsfc.nasa.gov/poetry/inspire/>
S.P. McGreevy Productions WR-3, <http://www.auroralchorus.com/wr3info.htm>
North Country Radio ELF Earth Receiver Kit, <http://www.northcountryradio.com>

Do you prefer to "roll your own?" Here are some websites that have plans for building Natural Radio receivers from scratch:

BBB-4 Bare Bones Basic Receiver, <http://www.auroralchorus.com/bbb4b.htm>
RS-4 Receiver, <http://library.thinkquest.org/2784/inspire/schematic.html>
IC Whistler Receiver, <http://www.lwca.org/library/hardware/whistlr.htm>
Dual FET Whistler Receiver, <http://home.flash.net/~evogel/p1.html>

The websites listed here were tested at the time of writing, but no guarantee can be made that they are still active, or that they still carry the information described.

The February issue of the Antique Wireless Association's *Old Timer's Bulletin* carried an interesting article on the use of Power Line Carriers (PLC) for data communication. Much of this activity takes place in the LF spectrum and the article explored the history of PLC and its potential effects on amateur and experimental transmissions. Part 2 is slated for the May issue and will discuss large-scale PLC systems, such as those being proposed to carry broadband over power lines (BPL).

Another article carried plans for building a low power AM Broadcast transmitter (with tubes, of course). The design could be scaled for LF operation with only a few modifications. For more information on the AWA and the *Old Timer's Bulletin*, please visit <http://www.antiquewireless.org>.

See you next month!

Great Ham Radio Reads

Well, judging from the returning birds and the budding branches I guess it must be coming on spring. But, there are other signs of springtime around the *Ham Bands* . . . that being, Uncle Skip's more or less annual book review column.

There are always a number of excellent new books coming out relating new and exciting ideas in amateur radio. As often as I can, I try to get a look at the best of these to pass on to the group. In this age of computer based media, I run across some interesting digital publications as well.

Back when I was learning to be a ham, I went to a class offered by the West Jersey Radio Amateurs. This was taught by a group of volunteers who each took a chapter of the good old "red & black" ARRL *Radio Amateurs License Manual*. There was a lot of information packed into the book for the cover price of a mere dollar. The problem was, as with any group of volunteers, not everyone was as skilled at either the information or, more importantly, how to teach the subject of ham radio. Somehow we all got through, but even today I wonder how it all worked out.

Training methods have come a long way and, as always, The Amateur Radio Relay League has led the pack in advancing ham license preparation tools. One of the best is their latest offering.

The ARRL Technician Class Video Course for Ham Licensing

4th Edition

Produced by King Schools for the ARRL
2 DVDs, 1 CD and a 127 page manual
\$149.00 plus shipping and handling
The American Radio Relay League
225 Main Street
Newington, CT 06111-1494
www.arrl.org/
1-888-277-5289
ISBN: 0-87259-884-5

Over the years I have taken great pride in helping a lot of folks get their ham tickets. And along the way I have been helped by the training videos produced by John KD6SCY and Martha KD6SCZ King. The Kings are well known for their excellent training tapes designed for folks seeking to get or upgrade their FAA aircraft credentials. They have taken their proven techniques and applied them to the Technician Class Amateur Radio li-



cense with equal aplomb. I have used their video tools for this purpose for over 10 years and I have recommended them to many clubs who were looking to start a ham training program.

By utilizing the skills and information that the King's supply in their video courses, your training organization no longer needs to worry about "weak links" or folks who miss their lecture because they had to work late or just forgot to show up to teach the class. The Kings are always there, in this new edition on DVD, to go through the essential theory and regulations needed to ace the 35 question, Element 2 Exam that leads to the Technician ticket.

The two DVDs divide the training up into 14 sections. The sections have varied "running times" but the manual makes some suggestions as to how to divide the subject matter up into regular classes. I've found by experience that the course information in the DVDs can be divided up into a nice 6 week, 1 session per week program that can fit into most folk's schedules. You and your training group can break the lessons up to suit your own needs.

On DVD disc one, the first two sections, *Getting the Most Out of Your Course* and *The Magic of Radio* basically set the mood and get people oriented to the King's teaching style. They are very excited about this subject and their enthusiasm is infectious. From there the class digs right in to the "meat and potatoes" topics of *Types of Emissions*, *Electrical Principles* and *Practical Electronics*. These topics are covered in a non threatening manner with memorable graphical support to help drive the key points home.

Next comes a section on *Operating Considerations* followed by the essential theory on *Antenna and Feedlines*.

DVD disc two goes on to cover the subjects of *Repeaters*, *Safety Practices*, and *RF Radiation Safety*. With all that under your belt, the disc moves on to the pertinent *FCC Regulations* that a student must master to get through Element 2. More depth is given to this area in the section related to *Frequency Privileges*, followed by *Repeater*, *RTTY* and *Packet Rules*.

Finally, the Kings give their suggestions on how to get through the examination process with their *Test Taking Hints*.

The move to take the King classes to DVD was a good choice on the League's part. One of the dangers of video tape is you can't always count on the reliability of the tape machine that may make itself available for a classroom situation. I've seen more than one tape get "eaten"

by a rogue VCR. The DVD format provides far less trouble in this area. As long as the discs are properly maintained they should last through many uses.

The video course is supported by a course book that highlights the essential topics that will turn up in the FCC Technician Class exam. The book contains the entire Element 2 Question Pool along with 3 practice exams.

A person, or a group, could sit down with this course and, at their own speed, take in all the information needed to sit for the test. But just like those late night TV commercials say, "But Wait! There's More!" Also included is a CD-ROM containing the ARRL Computerized Exam Review program. This program allows the student to practice taking any number of exams utilizing the entire Element 2 Question Pool until he or she feels confident to head over to the VE examination session. The computer keeps track of the student's progress towards being fully prepared on examination day. The CD-ROM requires Microsoft Windows as its operating environment.

At \$149, this course system is no casual purchase. But the price is well within the means of most ham clubs seeking to set up a class in their area. But if you are so inclined, the course is structured to be used by an individual. A club could purchase the series for their lending library. A civic minded ham could also purchase the course for their local public library. Regardless, the information provided and the manner in which it is presented make it well worth the cost.

Many thanks to the League and the Kings for their continued efforts in basic amateur radio training. I think that if I had John and Martha in my corner way back in 1976 I would have had a lot less butterflies in my stomach when I sat for my first ham ticket.

Next up we have a book that is a joint project by the Radio Society of Great Britain and The American Radio Relay League.

The International Antenna Collection

Edited by Dr. George Brown M5ACN
248 pages
\$19.95 plus shipping and handling
The American Radio Relay League
(see contact info above)
ISBN: 1-872309-93-3

This may not be a completely fair comparison, but over the years, as I have read ham radio books produced in both U.S. and UK, I have noticed a trend in relation to an-

tenna designs. U.S. publications seem to most often (no pun intended) reflect "optimum" antenna designs. But the UK publications always seem to emphasize purely practical designs that take into account that the operator may not have a "best possible case" antenna location.

There are advantages to both strategies. We'd all like a double stack of tribanders at 60 and 120 feet but only the lucky few have the real estate and the cash flow to pull it off. *The International Antenna Collection* draws on the best thinking of both of these worlds to produce a great antenna book in both areas of theory and practice.

The International Antenna Collection covers everything from the more traditional antenna design to portable and "stealthy" designs for those folks who need to keep a low profile due to location. Every antenna in the book can be built with common tools and materials. I also believe that anyone with basic skills and with said tools and materials can get any of these designs up and operational in short order.

It's hard to pick out specific antennas to highlight in a review such as this because everyone's needs and desires are different when it comes to antenna building. Since my way of radio play leans toward getting out to the field, I will point out a few that caught my fancy enough to send me out to the hardware store to get busy building them. The N1TKS *Paint Pole Aerial* is just the ticket for portable operation for 17 and 20 meters. I'm putting one of these together for my next trips to the beach this summer. I will probably also experiment with the W3JIP *Portable Aerial*, good for operation from 6 through 40 meters.

Amongst all these practical antenna projects are a number of excellent theory pieces. The VE2CV article on *A Brief Overview of the Performance of Wire Aerials in Their Operating Environments* sheds a great deal of light on what works and why in the "real world" environment where most of us live. Within this article is a case study of the often used but equally controversial G5RV dipole that should serve to clear the air about this design for many people.

Another excellent theory article is G3LHZ's *The Truth About Loops*. My experiments with loop designs over the years have been largely based on guesses and folklore. To finally come across an article that gives the practical math behind loops has renewed my interest. Now I can move beyond "cut and try" techniques to something that might actually load the first time I put power to it.

With everything from HF to UHF and all materials from metal to wire, this book has something for everyone who wants to put up their own "home brew" antennas.

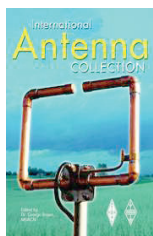
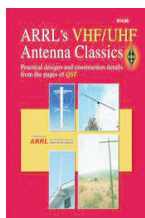
And here is another antenna book worth giving a good look.

ARRL's VHF/UHF Antenna Classics

Compiled by Steve Ford WB8IMY
125 pages
\$14.95 plus shipping and handling
The American Radio Relay League
(see contact info above)
ISBN: 0-87259-907-8

It's a funny thing. I often run across folks who will go through all sorts of effort to string up HF antennas. But when you start to talk about doing anything yourself above 10 meters these same folks seem to just stare at their shoes. I never quite got this. The very fact that most VHF and UHF antennas are usually so much smaller than their HF counterparts would seem to mean that you could have a whole lot more fun playing around with them. Also, given that most designs can be built right out of the aisles of any well stocked home improvement center only further supports my thinking on this.

If those antenna *Fraidy Cats* would just take a few minutes to go through the ARRL's *VHF/UHF Antenna Classics* I am sure they would stop looking at their shoes and start looking up on their roofs and towers for places to put these designs. Here you have 30 designs to choose from running from 50 MHz through 902 MHz. Most of which are true *gain* designs that will take a wimpy



handheld signal and make it roar!

I am always interested in VHF/UHF antennas that can be quickly put up and torn down for ARES/RACES use. This book includes the excellent WA9GDZ/6 *Portable Quad for 2 Meters*. The resultant gain and directivity of this lightweight purpose bred antenna could really make the difference in getting a signal back to Net Control from a remote location.

Antennas for 432 MHz lend themselves to stacking into arrays. A number of articles in this collection help show you the advantages (and potential problems) of pulling together a multiple antenna array for DXing, and even Moon Bouncing.

So there you have it. Three great radio reads. One to get you into the hobby and two to help you get your signal out once you get your ticket. Have fun! I'll see you on the bottom end of 40 meters.

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Kids Roundup

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Missouri QSO Party

Apr 3 1800 UTC - Apr 4 0500 UTC
Apr 4 1800 UTC-2400 UTC

QCWA QSO Party

Apr 3 1800 UTC - Apr 4 1800 UTC

ARS Spartan Sprint

Apr 6 0100 UTC - 0300 UTC

ARCI Spring QSO Party

Apr 10 1200 UTC - Apr 11 2400 UTC

Georgia QSO Party

Apr 10 1800 UTC - Apr 11 0359 UTC
Apr 11 1400 UTC-2359 UTC

Michigan QSO Party

Apr 17 1600 UTC - Apr 18 0400 UTC

Ontario QSO Party

Apr 17 1800 UTC - Apr 18 1800 UTC

World Amateur Radio Day Party

Apr 18 0000 UTC - 2359 UTC

QRP to the Field

Apr 24 1500 UTC - 2400 UTC

Florida QSO Party

Apr 24 1600 UTC - Apr 25 0159 UTC
Apr 25 1200 UTC - 2159 UTC

Nebraska QSO Party

Apr 24 1700 UTC - Apr 25 1700 UTC

Choosing a Scanner Antenna

Choosing an antenna for monitoring scanner activity is not difficult if you know a few basics about which antenna designs offer what kind of performance. Of course you must first decide what kind of performance you want from your antenna. So this month let's discuss these two questions: What are your goals in scanning, and which antennas can help you best achieve those goals? As you will notice from comments below, much of what we discuss can also be applied to shortwave listening or monitoring in general.

◆ Some Basics

In choosing an antenna for use in scanning or in any other kind of communications monitoring, you must consider the nature of the signals which you want to monitor. If you simply want to scan local stations then you are in luck. Chances are that locals will have relatively strong signals at your antenna, and in this case just about any piece of wire or metal rod one to three feet (a meter or less) in length will likely suffice.

A similar approach to an easy antenna on the HF and lower bands is the random-length antenna. The random-length antenna is simply any length of wire held in the air any way you decide to do it. See the antenna-related web sites listed below for information on building this antenna.

If, on the other hand, you want to monitor non-local stations with weaker signals,

then an antenna with some gain may be what you need. Antennas with more than average gain tend to be directional, and directionality can be useful both for directing the antenna's maximum gain toward the weak signal you seek, and for minimizing interference that comes from directions other than that of the station which you seek.

Antennas can exhibit directivity in both the horizontal plane (compass directions), and in the vertical plane (the degree to which they aim upwards). Graphs representing an antenna's performance in different directions are called its "radiation pattern." For scanning, which is most commonly practiced on VHF, UHF, or microwave frequencies, horizontal directivity is utilized by orienting the antenna's main horizontal lobe in the direction of the desired station. The same is true on HF.

On the VHF, UHF, and microwave bands, it is desirable to orient directivity in the vertical plane toward the horizon to maximize the distance over which these relatively line-of-sight bands can be utilized. On HF, however, as your signal skips from earth to ionosphere and back to earth, the best vertical angle for optimizing your communications depends on the distance you want to cover, on the state of the ionosphere, and on the frequency on which you are working. Very-high vertical angles can support close-in HF communication up to a few hundred miles. This assumes that the signal is below the

maximum usable frequency of the moment so that the signal doesn't punch through the ionosphere into outer space. For long-distance HF communication very low vertical angles are best.

◆ Some Popular Antenna Designs

The Quarter-Wave Ground-Plane Antenna:

This antenna consists of a vertical, quarter wavelength element with two or more quarter wavelength radials just beneath the bottom of that vertical element (fig. 1A). This antenna has an omnidirectional horizontal radiation pattern which gives good coverage in all compass directions, with little signal wasted in the vertical direction. On VHF and higher frequencies, this supports line-of-sight communication to the horizon. On HF it provides the low-angle vertical pattern that supports DX so well.

While the low gain of this antenna is quite adequate for many applications, more gain and vertical directivity can be had by utilizing versions with a longer vertical element (see below).

This antenna functions well only on one band unless it is made multi-band by the addition of traps or of elements for additional bands. It is a good choice for a base station when you want to receive signals from all directions. See the antenna-related web sites for information on building this antenna.

The Discone Antenna:

The discone antenna (fig. 1B) offers a much wider bandwidth than the ground plane antenna, while retaining essentially the same sort of vertical and horizontal patterning. It is also a low-gain antenna, but useful for many applications.

One variant of this design utilizes a vertical element atop the disk. The disk serves as a ground plane for this vertical element, which allows adding another band to the antenna's coverage.

The Half-Wavelength Dipole:

The half-wavelength dipole (fig. 1C) is utilized from MF on into the microwave bands. When used at frequencies above the HF band, dipoles are usually one part of an overall antenna system such as a dish antenna, or an array such as the Yagi-Uda. Dipoles are primarily one-band antennas, or they may

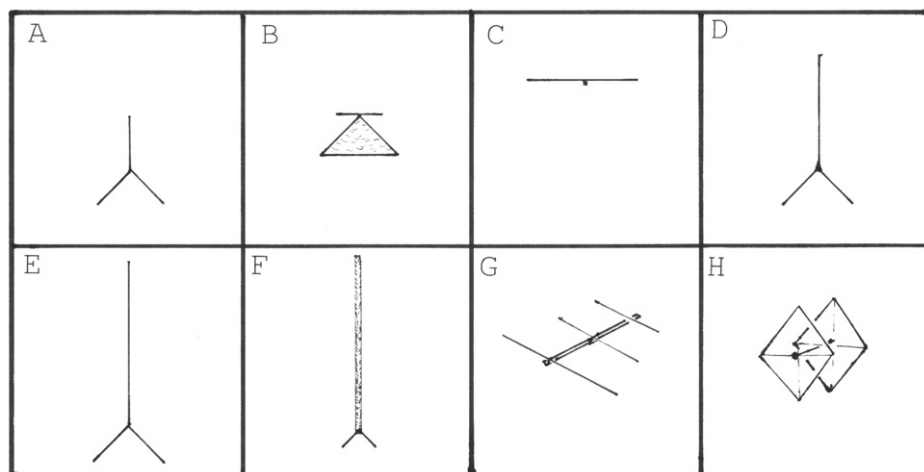


Fig. 1. A quarter-wavelength ground plane antenna (A), a discone antenna (B), a half-wavelength dipole antenna (C), a 1/2 wavelength ground-plane antenna (D), a 5/8 wavelength ground-plane antenna (E), a collinear ground-plane antenna (F), a Yagi-Uda beam (G), and a cubical-quad beam (H).

This Month's Interesting Antenna-Related Web site:

I have posted plans for building a various antennas at the <http://www.monitoringtimes.com/web/site/Random-length-antenna-at/html/mtantennaprimer1.html> dipole antenna at <http://www.monitoringtimes.com/web/site/Random-length-antenna-at/html/mtantennaprimer2.html> and a ground plane antenna at <http://www.monitoringtimes.com/web/site/Random-length-antenna-at/html/mtantennaprimer3.html>.

cover only part of one band. They do function well, but with more nulls near odd harmonics of their design frequency. They can be made multi-band by use of traps, or multiple elements.

Commonly, dipoles are mounted with their length horizontal to the earth, but vertical mounting is also used. When mounted vertically, they have an omnidirectional radiation pattern. Although a half wavelength dipole in space would have deep nulls off its ends, here on earth many horizontal dipole installations have relatively shallow nulls, and provide a somewhat non-directional horizontal pattern.

Half-wavelength dipoles have a medium gain level which is often used as a standard of reference for measuring the gain of other antennas. See the antenna-related web sites for information on building a dipole antenna.

Gainer-Type Ground-Plane Antennas:

The half-wavelength, 5/8 wavelength, and collinear ground plane antennas (fig. 1D,E,F), in that order, offer progressively more gain and more vertical directivity than the quarter-wavelength ground plane antenna. At VHF and higher frequencies both increased gain and increased vertical directivity are useful. On these relatively noise-free bands, increased gain is useful in receiving weak signals. The increased vertical directivity lowers the angle of the antenna's vertical pattern. This gives more concentration of the antenna's performance toward the distant horizon and to points in between the horizon and the antenna.

On HF and MF, due to the relatively high received noise level, increased gain is seldom of value. However, lowering the vertical angle of the antenna's patterning provides increased earth-to-ionosphere-to-earth skip distance and increases the antenna's DX potential. These antennas are an excellent choice for scanner base stations where reception of signals from both local and beyond-local stations from many different directions is desired.

Beam Antennas:

The Yagi-Uda (fig. 1G) is the most common beam for scanning use. Compared to other beam designs it is fairly rugged, and compact. High levels of gain and directivity are attainable with these beams. Again, increased gain and directivity are useful for VHF and higher frequencies. Directivity with the Yagi-Uda is, however, in the horizontal patterning, and thus allows pointing that gain

in the direction of the desired station while reducing noise and other interference from non-desired directions.

On VHF these beams are typically mounted with their elements vertical to match the typical signal polarization on that band. On HF horizontal mounting is typical. The vertical-angle patterning of these antennas is determined primarily by their height above earth. Mounting them at a quarter wavelength or less gives high vertical angles, and mounting at a half wavelength or more gives the desirable lower vertical angles.

The cubical Quad beam (fig. 1H) and its variants are also found on the HF and VHF bands. Most of these designs are less rugged and less compact than the Yagi-Uda; however, the quad design is preferred by some HF operators for its reputation of giving better service at low mounting heights than the Yagi-Uda.

Log-periodic directive-array beams (LPDAs) offer essentially the function of a Yagi-Uda beam, yet give multi-band coverage. These beams are larger than a Yagi-Uda of the same gain and directivity; however, they may be worth the extra cost and effort if you need that extra bandwidth.

◆ Outdoor TV and FM Antennas

Some operators report that their outside TV or FM antennas give satisfactory support for scanning. It's an inexpensive solution if it works for you.

RADIO RIDDLES

Last Month:

I said that the height of the wave front of a 100 kHz signal is well over a mile tall. I also said that the physical length of one wavelength of the 100 kHz signal is well over a mile. Then I asked: "Is this the reason the wave front is over a mile tall?"

Well, visualize a wave moving across the earth. Its front is the expanded surface of that energy which left the antenna at a particular moment. But the wavelength of that wave is the distance that front will travel in the time it takes to complete one cycle of the signal. So, no, wavelength does not directly determine the height of the wave front.

This Month:

I mention above that antennas with more than average gain tend to be directional. Is this really true for practical antennas? If not, why not, and if so, why?

You'll find an answer to this month's riddle, another riddle, another antenna-related web site or so, and much more, in next month's issue of *Monitoring Times*. 'Til then Peace, DX, and 73.

Outer Limits continued from page 69

Radio Free Speech- Veteran pirate broadcaster Bill O. Rights keeps the focus of his programming on the promotion of individual freedom, but he normally adds comedy to this serious subject. (Blue Ridge Summit)

Radio Pigmeat International- This station's classic rock music has already been heard several times in 2004 on the pirate bands. (Belfast)

Ragnar Radio- Their programming normally consists of rock music, announced to be coming from the Great Lakes. (Uses rangarradio@yahoo.com e-mail)

Sunshine Radio- Their rock music is still announced by a young boy with an odd southern accent. Sometimes the accent makes it difficult to copy the ID's. (None, but some replies have resulted via the grasscutterrado@yahoo.com e-mail address)

Take it Easy Radio- They still use their namesake Eagles rock tune as a theme song, but they also feature other classic rock. Early this year they also relayed old time radio dramas. (Uses takeiteasyradio@yahoo.com e-mail)

Undercover Radio- Dr. Benway, has broadened the significance of his slogan, "broadcasting from the middle of nowhere," by adding programming from Mars. (Merlin and undercoverradio@mail.com e-mail)

Voice of Captain Ron Shortwave- Captain Ron normally mixes rock music and comedy in what is a classic pirate station format. (Uses Captainron6955@hotmail.com e-mail)

WEAK- Veteran broadcaster Leonard Longwire has been hosting pirate broadcasts with a new call sign lately. (None known)

WJFK- This Kennedy memorial station often reappears around November 22 or on holidays related to the USA Presidency. Once again this year some of our listeners report that they received QSLs from them, even though they did not hear the station. We received no logs of them this month. (Apparently none needed)

WHYP- The James Brownard's memorial station has probably been the most active pirate over the last couple of years. Most of the shows on this one are humor about DXers and DXing. (Providence)

WMPR- The techno rock "dance party" music station is still a frequent visitor to the pirate bands. Unconfirmed rumors say that they could be responsible for various utility RTTY-like noises on the pirate bands lately. (None)

◆ QSLing Pirates

Reception reports to pirate stations require three first class stamps for USA maildrops or \$2 US to foreign locations. The cash defrays postage for mail forwarding and a souvenir QSL to your mailbox. Letters go to these addresses, identified above in parentheses: PO Box 1, Belfast, NY 14895; PO Box 28413, Providence, RI 02908; PO Box 69, Elkhorn, NE 68022; and PO Box 109, Blue Ridge Summit, PA 17214. Some pirates prefer e-mail, bulletin logs or internet web site reports instead of snail mail correspondence. The best bulletins for sending pirate loggings with a hope that pirates might QSL them remain *The ACE* (\$2 US for sample copies via the Belfast address above) and the e-mailed Free Radio Weekly newsletter, still free to contributors via niel@ican.net. The Free Radio Network web site, another outstanding source of content about pirate radio, is found at <http://www.frn.net> on the internet.

◆ Thanks

Your loggings and news about unlicensed broadcasting stations are always welcome via 7540 Highway 64 W, Brasstown, NC 28902, or via the e-mail address atop the column. We thank this month's valuable contributors: Artie Bigley, Columbus, OH; Cachito, Santiago, Chile; Ross Comeau, Andover, MA; Rich D'Angelo, Wyomissing, PA; Rudy Elsen, Castro Valley, CA; Harold Frodge, Midland, MI; William T. Hassig, Mount Prospect, IL; Chris Lobdell, Stoneham, MA; Greg Majewski, Oakdale, CT; Brent Pollack, Mariottville, MD; Mike Prindle, New Suffolk, NY; Lee Reynolds, Lempster, NH; Fred Roberts, Germany; Robert Ross, London, Ontario; Martin Schoech, Merseburg, Germany; John Sedlacek, Omaha, NE; and Niel Wolfish, Toronto, Ontario.

Book Reviews and Reader Comments

Last month, I mentioned the bizarre audio effects I had encountered on powering up our "All American Five" restoration project for the first time. I've since spent a couple of afternoons trying to find the cause of the motorboating and feedback that are distorting incoming signals beyond recognition, but I'm still stumped.

I've apparently localized the problem in the oscillator/mixer (otherwise known as the first detector) stage, but this could be illusory. Sometimes several stages interact in creating such problems – so if deactivating a stage seems to eliminate the problem, it might only mean that a feedback loop was interrupted.

Classical causes of motorboating are an open grid resistor, or grid circuit, in one of the stages – including an open loop antenna at the first detector stage. However, I've found no sign of anything like that. Other possibilities are an open bypass capacitor or a power supply output electrolytic that has lost capacity. These are also unlikely, since I've completely recapped the radio.

Removing plate voltage from the final audio tube (50L6), I could still hear the audio artifacts on headphones connected across the output of the first audio amplifier (12SQ7). Turning to a signal tracing technique, I found that a modulated 455 kHz signal sounded normal in the speaker when inserted at the i.f. amplifier (12SK7) grid, but sounded distorted when inserted at the first detector (12SA7) mixer grid. When the mixer plate was disconnected from the first i.f. transformer, the nasty noises did stop – as of course did the incoming signals.

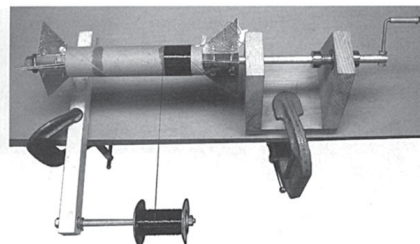
Looking for trouble in the first detector stage, I tuned in the receiver's oscillator in another receiver. Though it sounded a little rough, the oscillator did come in at the right frequency (455 kHz above the indication on the problem radio's dial). I also checked for continuity in the oscillator and loop antenna coils and tested the resistors in the circuit to make sure they were at or near the correct values.

That's the extent of the testing I've done so far, but if the trouble is really somewhere in this stage, there are very few places left to look! Perhaps there is a ground connection somewhere that has corroded and become inadequate for r.f. but not poor enough to show on an ohmmeter. I hope to be able to report a resolution of this problem in the next issue. But for now let's take care of some unfinished business.

◆ Book Reviews

Here are some interesting books that have come across my desk in the past few months. I've been waiting until I had space to do them justice, and it looks like this is my opportunity.

The Impoverished Radio Experimenter No. 5. Published 2003 by Lindsay Publications, P.O. Box 538, Bradley, IL 60915-0538, Phone 815/935-5353. 5-1/2" X 8-1/2". 41 Pages. Soft Cover. ISBN 1-55918-293-8. Available directly from the publisher at \$6.95 + \$1.50 s&h. For on-line ordering, visit <http://www.lindsaybks.com>.



Home-built coil winding machine from The Impoverished Radio Experimenter #5.

This is another of the slim, but information-packed, volumes in the Lindsay series about how to recreate interesting vintage electronic devices on the cheap. It deals mainly with building a superheterodyne receiver, taking the mystery and mysticism out of a project that many have hesitated to undertake.

If you follow Lindsay's directions to the letter, you'll not only build the receiver, but also wind the i.f. transformers and other required coils. During the discussion, the reader is given a short course in superhet theory and is shown how to build coil winding gear and alignment instruments. Like all the books in the "Impoverished" series, this is a fun and educational read even if you decide not to pick up your soldering iron.

The Complete Price Guide to Antique Radios: Tabletop Radios Volume 4 by Mark Stein. Published 2003 by Radiomania Books, 2109 Carterdale Rd., Baltimore, MD 21209. 8-1/2" X 11". 239 Pages. Soft Cover. ISBN 0-9647953-6-1. Discounted price when ordered directly from the publisher is \$24.95 + s&h of \$7.50 (U.S. and Canada) or \$15.00 (International). For on-line ordering, visit <http://www.radiomania.com>.

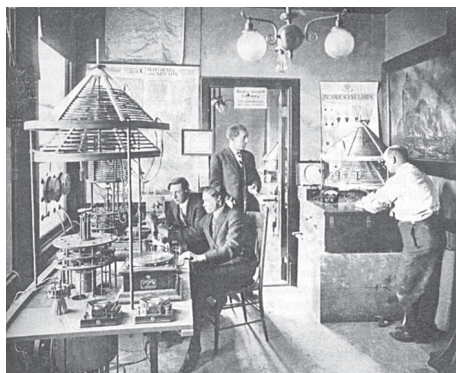


Sample thumbnails from The Complete Price Guide to Antique Radios: Tabletop Radios Volume 4. Note icons representing Ingraham cabinet (lower right) and radio by known industrial designer (upper left).

This is the latest offering in Mark Stein's indispensable radio identification and price guide series. It adds 2,500 new listings – including 1500 new thumbnail illustrations – to the 9000-odd listings included in volumes one through three. The new and expanded format includes special icons to indicate Canadian radios, sets with Ingraham cabinets or by noteworthy industrial designers, and sets commemorating (or at least sold at) the Chicago (1933) or New York (1939) world's fairs. As before, each listing also includes tube and band counts, options, variations and estimates of current value.

The introduction to this volume includes some helpful information that should be of special benefit to new collectors – including issues that determine value and things to consider when buying and restoring radios. There are separate categories for "Chassis and Trim" as well as for plastic and metal cabinets. A section on resources includes advice on finding sets, sources of parts, supplies and information, and vintage radio club listings.

Charles Herrold, Inventor of Radio Broadcasting by Gordon Greb and Mike Adams. Published 2003 by McFarland Company, Inc., Box 611, Jefferson, NC 28640. Phone 1-800-253-2187. 7" X 10". 259 Pages. Soft Cover. ISBN 0-7864-1690-4. Available directly from the publisher at \$45.00 + s&h of \$4.00 (U.S.) or \$6.00 (Canada and International). NC residents add 7% sales tax. For on-line ordering, visit <http://www.mcfarlandpub.com>.



Charles Herrold's San Jose radio station about 1912 from Charles Herrold, Inventor of Radio Broadcasting. Herrold stands in doorway. Perham Electronics Foundation Electronics Museum photo

Where did the first regularly scheduled radio broadcasts take place? There are several claimants to the honor, but most people think of station KDKA in Pittsburgh, which began in 1920. However, Charles Herrold was broadcasting radio entertainment and education to a mass audience around San Jose, California, as early as 1909. This biography focuses on how he used primitive technology to put on the air the station that eventually became the 50,000-watt KCBS (San Francisco).

Beginning with early family history, the well-illustrated and documented volume moves on to trace the career of this visionary man from the opening of his wireless school and radio station in 1909, through his training of radio operators for World War I, becoming licensed as station KQW following the war, and eventually running out of money and being forced to take menial jobs a few years later. Having been more adept at innovation than gaining recognition for his work, Herrold spent most of the rest of his life attempting to prove he was the "father of radio." This book is not only engrossing reading for those who enjoy following the work of the early inventors, it is also a valuable reference for serious radio historians.

◆ From the Readers

Besides the little backlog of books I've been saving up, there are also several reader comments I've been holding for a good opportunity to discuss. Many of these touched on the recent S-40-A restoration project.

Judy May wondered about my choice of gasoline as a solvent for cleaning tuning capacitors. She felt that it might have additives that would be damaging to the electrical characteristics of these parts. As alternate possibilities, she suggested automotive carburetor cleaner or perhaps brake shoe cleaner — which come in convenient aerosol cans. I haven't tested these yet, though I really like the idea of the aerosol cans. I did try some engine starter fluid I happened to have on hand by spraying it on a glass surface. That stuff seemed to leave behind an oily residue after ample drying time was allowed.

Perry Crabill corrected a slip I made in last December's issue during an S-40A

troubleshooting discussion. I had mentioned that the a.v.c. voltage was developed across the 2.2-megohm resistor shown in my example drawing. The voltage is, in fact, developed across the 500-ohm potentiometer; the resistor, with its associated capacitor, forms a filtering circuit that keeps audio voltage off the a.v.c. bus. **Paul Hart**, who was suggesting possible causes for my "strange audio" problem wrote to suggest checking for gassy tubes by observing whether a voltage drop was appearing across that same filter resistor (it wasn't). He advises that this is a much more sensitive test for gas than a tube tester usually provides.

A. Joseph Ross has a Hallicrafters S-77 that is physically identical to an S-40B whose picture I showed in one issue and wondered how it might be related. After a little research, I was able to tell him that the S-77 is an a.c.-d.c. version of the S-40B, using a different series of tubes whose heaters could be operated directly from the a.c. line. **J. Hartland** has owned and restored a couple of S-40s, and passed them along to prospective hams who used them to develop Morse code skills. He has also restored several variations of the S-38. **Tom Kneitel**, who wrote the CB columns for the original *Popular Electronics* magazine and the scanner columns for the Gernsback revival of PE, writes that the S-40A was his "dream receiver" (not counting the SX-42, to which he could not aspire). He upgraded from an S-38 to an S-40A at age 15 and had a lot of fun with it.

I have to apologize to the retired broadcast engineer who wrote me about the S-40 he converted for use in a shortwave link for a remote broadcast. I lost his note and so don't have his name. But he reported that the original audio output section was torn out and replaced with a broadcast-standard 600-ohm output for interconnecting with the studio equipment. He still has the radio.

David Tomlin enjoys the "boat anchor" coverage we've been doing in recent issues and likes the choice of test equipment that has been selected to restore. **Roger, K7DDG**, feels the same way about boat anchors and particularly enjoys restoring military ones. In this activity he finds "an escape from the tensions and stress of the modern world." Twisting the knobs on his Icom, he says, "just wasn't good enough."

In a letter harking back to my discussion about Lokalt tubes many months ago, **Doug Robertson**, who worked on auto radios in the 1940s, remembers how helpful the design was in keeping the tubes in their sockets in spite of the poor suspensions and cobblestone streets of the era.

Finally, commenting on one of my last columns, **John Malley, N1LZI** highly recommends "Gojo" hand cleaner as a cleaning agent for Bakelite and other types of radio cases. He's been using it successfully for years. It's available at most auto supply stores and the auto section at Wal-Mart. Use generous amounts to cover the case and wipe it off with a cloth after 10 minutes or so. But be sure to use the cream version of this hand cleaner; not the one with Pumice.

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Uniden BC296D Portable Scanner

We reviewed the Uniden BC250D handheld scanner in May 2003. The new Uniden BC296D model is basically a BC250D fitted with enhanced firmware to add new capabilities. Both models compete with the Radio Shack PRO-96 (Dec. 2003 MT).

Both the BC250D and BC296D share the same wide frequency coverage, including the UHF military air band. Both models can follow conversations in conventional and several different types of trunked systems, but trunk tracking is where the two scanners differ.

The earlier BC250D could demodulate APCO P-25 digital signals only when fitted with an optional BCI 25D card. The BC296D scanner contains a new digital card which is furnished with the radio. The Radio Shack PRO-96 is designed to demodulate C4FM signals. Both Uniden models can detect both C4FM and the newer, less common CQPSK type modulation.

The BC296D and PRO-96 are able to track APCO 25 systems which employ a control channel with either a 3600 or 9600 bps (bits per second) rate. The BC250D does not support the 9600 bps control channel.

There are no APCO 25 digital trunked systems located within our reception range, so we could test BC296D only with analog systems.

The BC296D has more features than we will cover, therefore we recommend you download an electronic copy of the owner's manual from the Support section at <http://uniden.com>.

Like the BC250D, the BC296D tunes 25 - 512, 806 - 956 (minus cellular phone), and 1240 - 1300 MHz.

The BC296D provides 8 step sizes plus an AUTO setting, the latter being determined by frequency. A 6.25 kHz step has been added beyond the choices available in the older BC250D, though a 8.33 kHz step is not supported by either model. The PRO-96 steps sizes are "hard coded" and not user selectable.

The BC296D Service Search, Limit Search, and Auto Store implementations rank among the best of any handheld model we've tested. There

are 10 limit search ranges which can be "chained" together. The BC296D user can choose the frequency step in each limit search bank.

The 12 Service Search banks are weather, public safety, news, television broadcast audio, ham radio, marine, railroad, air, CB, FRS/GMRS, racing, and special. The "special" bank consists of low power, itinerant, and interstitial frequencies. We heard fast food drive up window intercoms in this bank, for example.

What You Get

The BC296D comes with a user manual and two frequency guides. The supplied 6 inch, rubber covered antenna looks to be the same helical antenna used by other recent Uniden models.

The BC296D is packed with a CDROM containing software for controlling and programming the scanner using a PC running Microsoft Windows. The software was not ready when our sample BC296D was sent from Uniden, but should be included by the time you read this column.

Uniden includes a cable to connect the BC296 to a computer's 9-pin serial port. One BC296D may be cloned to another using the furnished cable together with an optional adapter.

Uniden's custom 4.8 volt, 1500 mAH NiMH rechargeable battery pack (see photo) is packed inside the radio. The included AD-600U wall wart power supply is used to recharge the internal battery in 14 to 16 hours. You can listen to the scanner while recharging, but the manual warns that you should disconnect the wall wart after charging completes.

Radio Shack's GRE-made scanners have a superior battery setup. They are powered by four individual AA batteries and you, the customer, get to choose your favorite style alkaline, NiCD, or NiMH batteries. GRE-made scanners like the PRO-92 and PRO-95 are supplied with two battery holders; one for rechargeable and another for alkaline cells.

A regulated supply could be connected to the BC296D via the optional UA502 DC power



cord, available at the Uniden web site for \$6.60.

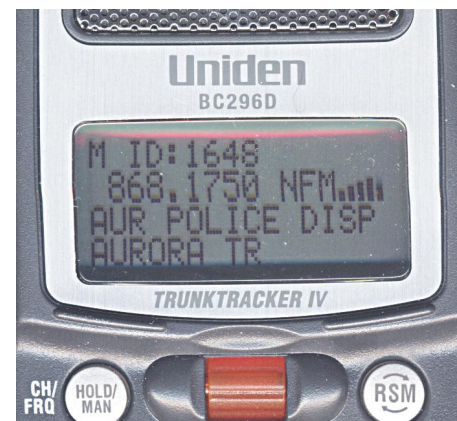
The snap on plastic belt clip is the same type which comes with the BC250D. Four fingers clamp into notches on the sides of the radio and a spring loaded clip grabs your belt.

Memory

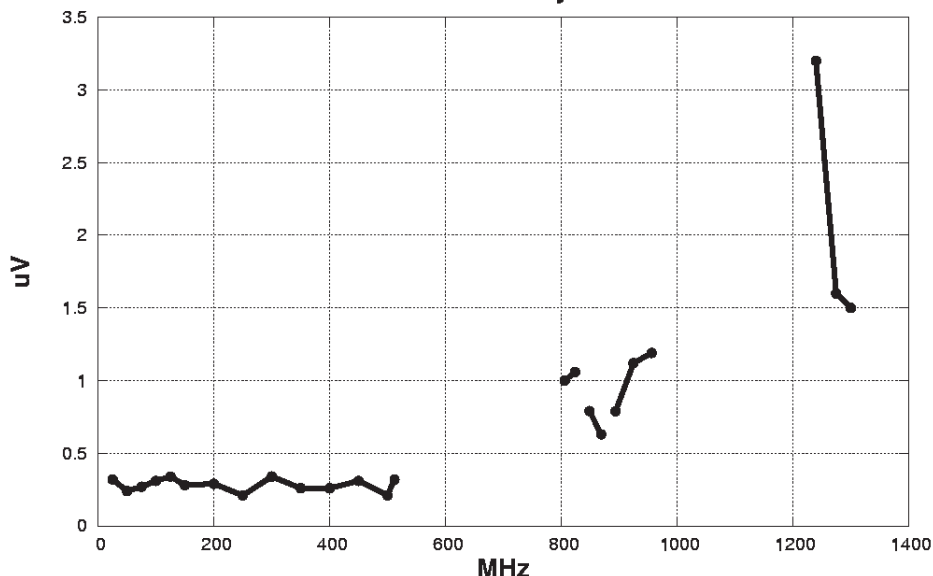
The BC296D's 1000 memory channels are separated into 10 banks of 100 channels each. Each conventional channel may be programmed with these attributes: a frequency and mode (AM, FM, WFM, NFM), a 16 character label, step size, rescan delay on/off, lockout, attenuator on/off, CTCSS or DCS tone squelch, and beep alert.

Trunked Systems

There are a wide variety of trunked systems in use and the BC250D is designed to track conversations in these systems: Motorola Types 1, 2 (VHF, 400, 800, and 900 MHz), EDACS (Wideband 9600 baud, Narrow 4800 baud, and SCAT), and LTR. SCAT stands for Single Channel Autonomous Trunking and is an EDACS configuration in which a single frequency serves



Uniden BC296D FM 12 dB SINAD Sensitivity s/n 319Z34000012



as both as a control and voice channel.

The BC296D can demodulate APCO 25 digital voice on conventional and trunked systems employing 3600 and 9600 baud control channel signaling, with C4FM or CQPSK modulation.

As with the earlier Uniden models, EDACS and LTR frequencies must be programmed into memory channels in the proper sequence.

Construction

The BC296D is a large scanner – near in size to the Radio Shack PRO-92. Rubber grips along the side of the BC296D make it easier to hold without slipping from the hand.

The BC296D's liquid crystal display is a dot matrix, i.e., composed entirely of small dots. The display options are essentially the same as the BC250D. Pressing the lamp key causes the display to be lit in an orange color and there are menu options for two brightness levels. The lamp times out after 15 seconds or may be set to remain on continuously.

Missing from the display are indicators for Tone Squelch, Attenuator, and Rescan Delay, so you cannot tell at a glance whether these options are enabled or disabled on a particular channel. To view a channel's configuration, push and hold the Menu/Back key for a couple of seconds. You can then see the channel settings, but you must scroll through them because the screen shows only three settings at a time.

The keypad can be backlit, which makes it easy to use the BC296D in the dark. The keys have tactile feedback, but require more pressure than other models. It's a good idea to enable the keypad confirmation beep tone.

Usability

You can program conventional memory channel frequencies using one of two procedures: 1) By positioning to the desired channel, then typing in the frequency followed by pressing the E key, or 2) Navigating the menu system.

The simpler, direct method works, but only for frequencies which coincide with the default step size. For example, the default step size is 50 kHz in the 225 - 399.95 MHz military air band. If you enter 335.525 MHz directly, the BC296D will coerce the frequency to 335.55. You can then use the menu system to "drill

down" to the STEP submenu, change the step size to 25 kHz, then re-enter the 335.525 frequency. Now, the BC296D will accept the frequency without rounding.

You can program alphanumeric labels for memory channels, banks, and talk groups. The BC296D makes it easier to distinguish "new hits" from previously programmed talk groups. If a programmed talk group becomes active while searching for new talk groups, the BC296D will display both the ID and the group label. This is an improvement over the earlier BC250D which would show the ID but not the label while searching. If the BC296D detects activity on a talk group not previously programmed, the word NEW is displayed.

You can tune the BC296D to a frequency without programming it in a memory channel using the following procedure:

1. From normal SCAN mode, momentarily press HOLD/MAN.
2. Then press and hold the HOLD/MAN button until the display changes to ROTARY:FREQUENCY.
3. Then type in the freq you want to tune to without hitting E/enter (i.e. 1, 6, 2, ., 5 for 162.5 MHz)
4. Finally, push the rotary up or down and the radio tunes to your frequency.

Other Observations

Our BC296D has loud audio, better than the tiny palm sized scanners we usually carry. The user manual does a fair job covering the BC296D's features, though we found the instructions for programming a trunked system had some gaps.

Overall

The BC296D strikes us as more powerful than the PRO-96 for general purpose scanning due to the Uniden's wider frequency coverage, richer search capabilities, selectable step sizes, C4FM/CQPSK demodulator, FM bandwidth choices, and other features.

That said, the PRO-96 has a better battery arrangement, multiple configurations (virtual folders), and an instant CTCSS display.

❖ Trunkito MPT1327 Trunk Tracking Software

MPT1327 is the trunking standard in Europe and popular in other parts of the world, except for the USA. Several manufacturers build MPT1327 compliant radio equipment, but there are no hobbyist scanning receivers designed to track MPT1327 systems.

Javier Moreno wrote in to alert us to Trunkito, new MPT1327 trunk tracking software for hobbyists. Trunkito decodes and tracks MPT1327 trunked systems and runs on computers equipped with the Linux operating system, a sound card, and an ICOM receiver. Trunkito may be used with a single ICOM scanner or with two scanners; an ICOM for tracking calls and a generic scanner for decoding the control channel.

Trunkito is free, open source software. See the <http://unixforge.org/~tronkito> web page for more information.

The Uniden BC-296D is available for \$524.95 plus shipping from Grove Enterprises (1-800-438-8155 or visit <http://www.grove-ent.com>).

Measurements

Uniden BC296D Scanner S/N 319Z34000012

List price \$999.99
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tel. (800) 554-3988
<http://www.uniden.com>

Frequency coverage (MHz):

25 - 512
806 - 823.9875
849.0125 - 868.9875
894.0125 - 956
1240 - 1300

Step sizes (kHz):

5, 6.25 7.5, 10, 12.5, 25, 50, and 100, AUTO

Modes:

AM, WFM, FM, NFM, conventional digital APCO 25, user selectable

Trunking:

Motorola Type I, II, III Hybrid, APCO 25 Phase 1 digital (3600 and 9600 bps control channel), EDACS, EDACS SCAT, LTR.

NFM modulation acceptance:

12.5 kHz

Audio output at earphone jack:

0.11 watts @ 9% distortion

Attenuator:

1 dB @ 40 MHz
10 dB @ 155 MHz
23 dB @ 460 MHz
27.5 dB @ 860 MHz

Image Rejection Due to 1st IF (380.7 MHz):

39 dB @ 40 MHz
46 dB @ 155 MHz
92 dB @ 460 MHz
74 dB @ 860 MHz

Useful Programs for Radio Users

❖ TRX-Manager

First, my apologies to the author of this ambitious program for logging, receiver control and so much more. I have been holding it for review for such a long time that a number of new revisions have been issued. We will look at the latest version 3.6.1. But be warned: This program does so much we will just barely scratch the surface of its capabilities.

TRX Manager allows computer control of just about everything in the monitoring shack, including radios (both transmit and receiver), decoder, logging and antenna rotator control. Using its Remote features TRX-Manager can also control stations outside your shack via the Internet, LAN or a packet link. In addition it keeps track of DX spotting, award tracking and satellites.

What You'll Need

The 12.5 MB Zip file took a while to download but then installed quickly and without a problem using WinZip. The computer requirements are modest:

- PC or compatible, Windows 95/98/ME/NT4/2000/XP - 32 M RAM - Pentium 200 MHz or higher
- X-VGA monitor (in preference to a S-VGA)

- For Computer Control you'll also need:
- 1 serial port for radio interface (Com 1-16)
 - Level converter (except FT-847/920/1000MP TS-570/870/2000)
 - 32 bits connection to Internet (optional)
 - TNC or multimode controller + serial port (optional)

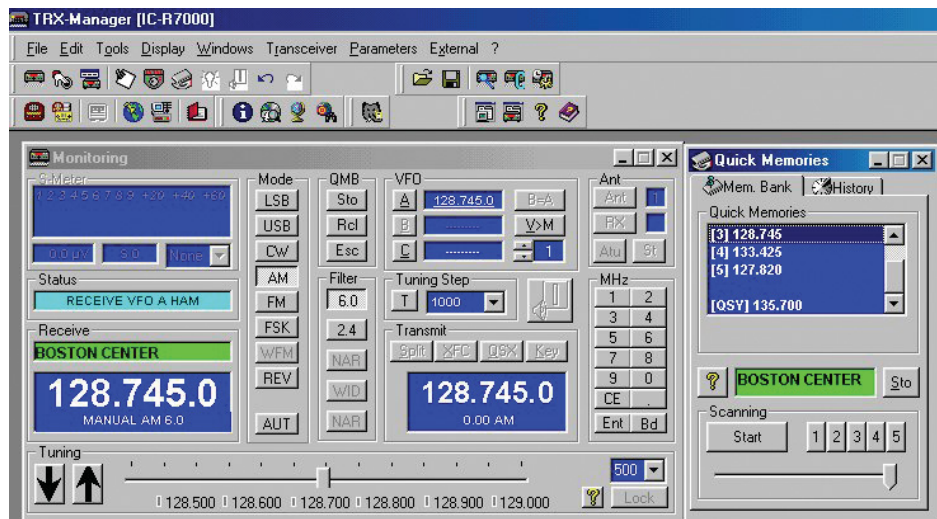


Figure 1- TRX-Manager's "Monitoring" and "Control Panel" Screen

- Rotator interface + serial port (optional)
- a free parallel port for the band decoder (optional)
- Yaesu, ICOM, Kenwood, TenTec, JST and Alinco transceivers are supported. Supported receivers include Yaesu (FRG-9600, FRG-100 & VR5000), ICOM (R75, R7000, R7100, R8500 and R9000), Kenwood (R5000) and JST (NRD545).

Lots to Control!

In order to take full advantage of TRX Manager's capabilities you will also need a computer-controlled receiver/transceiver and the appropriate computer-to-radio interface cable.

Figure 1 is the business screen of TRX-Manager. Although I tested TRX-Manager with an R7000 and an FRG-9600, for the figures I've used the R7000 screens. As you can see, a lot is happening here. Using the command key at the top of the screen, I've opened the "Monitoring" and "Control Panel" screens which are shown in the bottom 3/4 of the display.

All receiver (or transceiver) parameters can be set from this display. Tuning can be accomplished in a number of ways: direct numeric input, tuning knob (shown on left), up/down arrows and from stored memories (QMB) or VFO (A,B,C). Using the QMB buttons bring up the "Quick Memories" display which shows all stored frequencies.

I Command You!

The command line at the top of the screen is where all the setup information is customized to your radios and hardware. Below this line are two rows of Command Keys that are used to

display many different function screens. These special function/displays include: Monitoring (as shown), Band Scope, Terminal Screen, Command Panel, DX Bar, Scan Memories, Log Book, Internet Web Cluster, Audio Recorder Control and Shortwave Listening Screen.

Shortwave Listening

We perverted the use of the Shortwave Listening screen by using it with the R7000, which is a VHF/UHF receiver. Figure 2 displays the logging screen. Here you can see where we have manually tuned the R7000 to a number of NOAA weather stations and aircraft frequencies. Once tuned, a click of the "+" automatically logs the frequency and mode. The user can then add info to the database as desired. The user can choose which column titles are to be included in their custom database.

Freq	Mode	Band	Date	Time	On	Time	Off	Type	Program	Comment
127.62	AM	A3	12-00-00	12-00-00						
127.62	AM	A3	12-00-00	12-00-00						
127.62	AM	A3	12-00-00	12-00-00						
127.62	AM	A3	12-00-00	12-00-00						
127.62	AM	A3	12-00-00	12-00-00						
127.62	AM	A3	12-00-00	12-00-00						
127.62	AM	A3	12-00-00	12-00-00						
127.62	AM	A3	12-00-00	12-00-00						
127.62	AM	A3	12-00-00	12-00-00						
127.62	AM	A3	12-00-00	12-00-00						

Figure 2- TRX Manager's Shortwave Screen Being Used for VHF/UHF Monitoring

Once logged, the stations can be scanned by the radio using the "<>" keys at the top of the log area. TRX Manager does so much that each time I look at a screen I find more functions!!

The extensive Help file quite honestly points out that with all the different computer interfaces, functions and radios that are trying to be accommodated some commands will act "buggy." I did experience some unexpected results when I tried to use the edit functions on the Shortwave screen. The program seemed to get stuck in the edit mode. I had to close and then re-open the Shortwave screen in order to achieve normal operation. I also found that my R7000 sometimes went into the SSB mode instead of the program chosen FMn mode.

Some of these problems may be a result of my R7000 being one of the first off the production line many years ago. I think the R7000 product line had a number of firmware updates during its life. Secondly, the interface I am using is not an ICOM product, but one which I built. However, this interface has performed flawlessly in the past with both my R71 and R7000.

DX beacon frequencies, maps, Internet web

Although primarily aimed at the Ham radio user, TRX-Manager has so many features that it will be useful to radio monitors as well. Before you spend the 70 Euros for TRX-Manager version 3.6.1, try the free demo version, which is limited to 30 minutes of serial port time per session and 30 days. It is available at <http://www.trx-manager.com/>.

A while back we looked at the nifty SeaTTY program. As the promo states, "This program is designed to receive weather reports, navigational warnings and weather charts transmitted in RTTY, NAVTEX and HF-FAX (WEFAX) modes on longwave and shortwave bands. Additional hardware is not required – you need only receiver and computer with sound card. Minimal requirement for computer speed is about Pentium-100." That just about says it all, except that it runs on Windows 9x/NT/2000/XP.

The HF-FAX mode was added long ago but continued to be the subject of modifications, even in the last few versions.

Perhaps it was just propagation, but I found it quite difficult to find an unencrypted RTTY signal on shortwave. Gone are the days of hundreds of unencrypted RTTY stations.



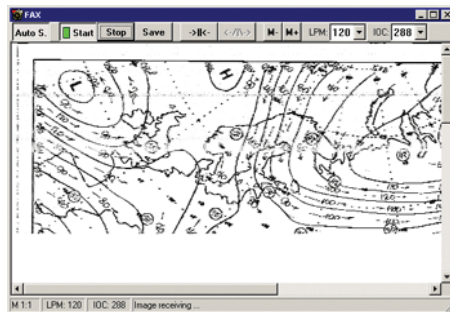
However, even NAVTEX signals on 518 and 490 kHz were nowhere to be found, either. So perhaps propagation made an already bad situation worse. An HF Fax station was booming in at 5.110 kHz. After a few days of trying I finally was able to find a NAVTEX station at 518 kHz with reasonable signal strength. This is shown in Figure 3.

The 1.6 Meg program is in a Zip format and takes about 15 minutes to download via dial-up. Figure 3 shows a typical SeaTTY v1.35 RTTY/Navtex screen with lots of information being displayed. The top section is where the input signal characteristics are defined: shift, speed and mode. Also, the important AFC and Squelch (SQL) are controlled from this section.

The AFC, or automatic frequency control, is really an auto shift. In RTTY the shift is defined as the difference in frequency between the signal's two audio tones representing digital "1"s and "0"s. When on this function it sets the shift to the difference in frequency of audio peaks that it hears. Using the Squelch, a noise floor can be set, below which the decoder will not listen. However, in Figure 3 we have disabled the Squelch. The input signal can be "seen" in the graph with its two peaks marked by the vertical lines.

Decoded RTTY/NAVTEX is displayed in the next section down the screen. The user can choose to store the files displayed to the hard drive automatically for recall at a later time. The very bottom of the screen displays a graph of the decoded data stream. Once I had a NAVTEX signal, decoding was effortless.

The HF FAX screen can be seen in Figure 4 which is taken from their website. Operation is pretty straightforward as far as FAX operation goes. Clicking the "S" button allows you to automatically start the FAX by listening for the



APT tone. The “M” buttons are used to change the scale of the received image.

The “>|<” button rotates the image horizontally, while the “</\>” button is used for slant correction. Slant correction is the difference between your computer’s internal clock frequency relative to the atomic standards used by the transmitting stations. If this correction is not made, the FAX image appears to be

Version 1.35 of SeaTTY is available at **<http://www.dxsoft.com>** for a registration fee of \$35.

I suggest you go to TRX Manager and SEATTY's websites and you be the judge. But I predict that if you try 'em, you'll like 'em. Till next time, Happy Spring to all.

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MT REVIEW

AOR's Top-End AR-ONE

By Bob Grove

A new, high-end receiver has been released from AOR, the AR-ONE with continuous 10 kHz-3.3 GHz frequency coverage. While hobby monitoring enthusiasts might wonder why some familiar features are missing from this high-end product, the fact that AOR is constantly out of stock on this receiver would indicate that the intended market is well satisfied.

The AR-ONE is a compact (6-1/4"W x 2-1/2"H x 9"D), mobile-styled receiver weighing 4.5 lbs. Operating power is a nominal 13.5 VDC at 2 amps (max.), available from the user's mobile battery (cable connector provided) or an optional 120 VAC power supply. One single antenna connector (N style) is provided for the entire tuning range. For compact, portable deployment, AOR recommends their SA-7000 wideband antenna.

While the receiver does offer some remarkable perks, its few shortcomings will be discussed throughout this review.

The AR-ONE's incredible frequency range is the widest on the general market, covering more than 99% of all the listening targets that one would normally monitor throughout the spectrum, including wideband 802.11B allocations. But this receiver also scans cellular telephone frequencies, making it unavailable to the general public, and it has a substantial price tag — \$4495.

So who is the intended market? The receiver is directed to government, military, and other professional monitoring organizations as well as non-U.S. clients conducting signal surveillance.

Its frequency stability (0.1 ppm -10 to +50 C.) is lab quality, assuring drift-free reception; for even closer tolerances, a rear-panel input jack allows connection to an external 10 MHz reference oscillator. An optional spectrum display unit (SDU) like AOR's SDU5600 or AVCOM's SDM42A or B can be attached to its 10.7 MHz IF output jack. For more detailed signal analysis, a 455 kHz output is also provided.

The receiver can scan 1000 memory channels as well as search between frequency limits, and there are 10 separate VFOs. Modes include AM, NFM, WFM, USB, LSB, CW and data, but no synchronous AM detection. But users wishing to have the benefit of narrow-band SSB detection of full-carrier AM may do it the old-fashioned way: choose USB or LSB for minimum interference, and adjust the remarkably-stable fine tuning for natural sound ("zero beat").

The receiver may be operated as a stand-



alone system, or remotely operated via two RS-232C ports. Up to 99 separate receivers may be controlled by one PC. No OEM software is available, but the operating manual contains a command set for all functions.

The receiver is designed with triple-conversion architecture, and has a third-order intercept of +2 dBm up to 2.5 GHz (-1 dBm above). Dynamic range is 90 dB or better. Sensitivity is specified as 0.5 microvolts at VHF/UHF NFM. Signal strengths are displayed in either dBm or S units.

Standard frequency steps are 1, 10, 50, 100 and 500 Hz, as well as 1, 2, 5, 6.25, 9, 10, 12.5, 25, 50 and 100 kHz. The user may also configure any step in 1 Hz increments up to 1 MHz to assist in automatic tracking of band plans while tuning, searching or scanning. An on-screen menu also permits automatic determination of appropriate frequency steps and modes for the bands selected.

Intermediate Frequency -6dB selectivity and -60 dB rejection points are: 0.5 kHz @ <2 kHz; 3 kHz @ <6 kHz; 6 kHz @ <20 kHz; 8.5 kHz @ <30 kHz; 16 kHz @ <40 kHz; 30 kHz @ <70 kHz; 100 kHz @ <450 kHz; 200 kHz @ <600 kHz; and 300 kHz @ <900 kHz.

◆ Let's try it out

When switched on, it takes a full five seconds to observe anything happening, leading some initial users to suspect something's wrong. But after the initialization period, the radio is fully awake and ready to go. And once you've done this, you won't be concerned about the waiting period next time you turn it on!

Although the LCD is edge-lighted and allows user-adjustable contrast, the user must look at it nearly straight-on, as characters disappear rapidly with increased viewing angle. Rubber-bumper feet invite desktop listening, but there is no tilt bail to prop the receiver up toward the user so he can see the readout. Of course mobile mounting at an angle is a cinch, and the receiver can be elevated to or suspended from a shelf, rack mounted, or tilted with a block for fixed use.

Attaching the receiver's single N connector to an appropriate antenna system for its full frequency range means either externally switching antennas, or using an external multicoupler. Our test antennas were a GAP Titan vertical below 30 MHz, and a CREATE log-periodic above. The A/B test was measured against an ICOM R8500 wide-coverage receiver.

Sensitivity was now virtually identical to that of the ICOM, although we had to return our first test unit which had profoundly-deficient sensitivity below about 200 MHz that worsened the lower in frequency it was tuned. The replacement unit performed as it should.

Spurious signal rejection was better on the AOR. SSB detection was very good, but strong signals pumped the AGC noticeably, and no setting of the AGC timing configuration made any difference. The only way to stop the distortion from the pumping was to reduce the RF gain. The factory has been notified of this apparent deficiency.

Audio power is a substantial 2 watts, certainly enough to drive the internal 2-inch speaker to distortion (although sound is good at reasonable listening levels). An external speaker jack allows the full output to drive a larger speaker. An on-screen menu prompts custom contouring of the audio passband, as well as massaging of other options.

The volume control has a peculiar characteristic of suddenly coming alive as it is rotated clockwise, then incrementally shifting levels of audio rather than smoothly gliding. This is most noticeable on background hiss.

The AR-ONE has no noise-reduction circuitry, making its intended mobile installation, or even a fixed/portable application in a noisy location, questionable without the use of an ancillary noise-canceling system.

The illuminated, rubberized keypad is small, but easy to see and use; the tuning knob is also small, but it is rubberized, making it quite manageable.

◆ The Bottom Line

So do the wide frequency coverage, high intermod rejection, PC control flexibility, small size, and available IF outputs justify the cost? Apparently so, if current government and military sales are any indicator.

Available accessories (not included): 120 VAC Adapter, MM8600 mobile mounting kit.

The AOR AR-ONE is available from Grove Enterprises for \$4495 plus shipping.

6757	Aero Off Route US Air Force Worldwide (USB/ALE) - Airborne Command Post Network <Z-165>
6760	Aero Off Route US Air Force Worldwide - French Navy Tactical Network/NATO AWACS Discrete DHH66 Geilemkirchen "Magic"
6761	US Air Force Air Refueling Tactical Worldwide
6763	Bellcore/Power Utility Network Nationwide (USB/ALE)
6766	US Army National Guard Nationwide (USB/ALE)/Interior Department Network Nationwide
6785	US Army Corps of Engineers Point to Point Network Nationwide (USB/ALE) <Channel 7>
6800	US Government SHARES SCN BBS Network Nationwide (USB/ALE) <Channel 9>
6802	AT&T Point to Point Network Nationwide
6809	Federal Emergency Management Agency (FEMA) FNARS Network Nationwide (USB/LSB)
6815	US Coast Guard Tactical
6820	US Air Force Western Missile Range "Aria Control"
6821	Environmental Protection Agency Point to Point Network Nationwide
6835	US Navy FACS/FAC Frequency Pensacola, FL "Seabreeze"
6840	Federal Aviation Administration (FAA) Network Nationwide (USB/ALE)
6845	National Communications System (NCS) Nationwide
6858	American Red Cross Disaster Network Nationwide
6870	Federal Aviation Administration (FAA) Network Nationwide (USB/ALE)
6910	US Army National Guard Nationwide (USB/ALE)
6911	US Air Force E-8 JStars aircraft discrete
6937	US Navy Space Shuttle Support Network Atlantic Ocean
6962	Canadian Forces Affiliate Radio System (CFARS) Worldwide <Xray>
6978	Canadian Forces Affiliate Radio System (CFARS) Worldwide <Alpha>
6981	NASA Point to Point Network Nationwide
6982	Canadian Forces Affiliate Radio System (CFARS) Worldwide <Whiskey>
6993	US Air Force Mystic Star VIP Support Network Worldwide
6996	International Red Cross Worldwide (Various)
7300	Drug Enforcement Administration Worldwide <Charlie>
7302	US Air Force MARS Transcontinental Network Nationwide
7335	Time/Frequency Standard Station CHU Ottawa, ON Canada (AM)
7348	Federal Emergency Management Agency (FEMA) FNARS Network Nationwide (USB/LSB)
7375	Transportation Department Emergency Net Nationwide
7381	US Navy/Marine Corps MARS Network Nationwide
7412	US Air Force Hurricane Contingency Support Net Eastern Test Range
7419	Federal Highway Administration (FHWA) Network <F-03>
7421	US Coast Guard Tactical
7428	Energy Department Network Nationwide
7461	NASA Space Shuttle Support Network Atlantic Ocean
7475	Federal Aviation Administration (FAA) Network Nationwide (USB/ALE)
7477	US Federal/State Government Operation Secure Nationwide
7480	US Federal/State Government Operation Secure Nationwide
7485	Federal Aviation Administration (FAA) Network Nationwide (USB/ALE)
7500	US Marine Corps Tactical Network Worldwide
7507	US Navy/Coast Guard Hurricane Contingency Net
7527	Immigration and Customs Enforcement (ICE) COTHEN Network Worldwide (USB/ALE) <Scan-1>
7530	US Coast Guard 9th District Network (USB/ALE)
7535	US Navy SESEF discrete Norfolk, VA
7540	US Air Force MARS Transcontinental Network Nationwide
7545	US Air Force MARS Transcontinental Network Nationwide
7549	American Red Cross Disaster Network Nationwide
7582	Transportation Department Emergency Net Nationwide
7590	Armed Forces Network (AFN) Iceland Local Night
7611	Federal Aviation Administration (FAA) Network Nationwide (USB/LSB/ALE)
7626	US Coast Guard Tactical
7632	US Air Force ALE Network Worldwide (USB/ALE)
7633	US Air Force MARS Phone Patch Network <ACJ>
7635	Civil Air Patrol (CAP) Nationwide
7646	US Army National Guard Nationwide (USB/ALE)
7657	Drug Enforcement Administration Worldwide Night Secondary <Foxtrat>
7672	NASA Space Shuttle Support Network Atlantic Ocean
7773	US Coast Guard Tactical
7802	US Federal/State Government Operation Secure Nationwide
7805	US Federal/State Government Operation Secure Nationwide
7831	US Air Force Airborne Command Post Network Worldwide <Z-170>
7880	Interior Department Network Nationwide
7884	US Coast Guard Tactical
7909	US Coast Guard Tactical
7932	US Federal/State Government Operation Secure Nationwide
7935	US Federal/State Government Operation Secure Nationwide
8037	US Army National Guard Nationwide (USB/ALE)
8047	US Army National Guard Nationwide (USB/ALE)
8050	Canadian Forces Military Discrete Worldwide
8053	US Army National Guard Nationwide (USB/ALE)
8056	US Army National Guard Nationwide (USB/ALE)
8091	US Coast Guard Tactical
8093	US Army National Guard Nationwide (USB/ALE)
8101	Marine Simplex/Duplex (Shared) Worldwide
8104	Marine Simplex/Duplex (Shared) Worldwide
8107	Marine Simplex/Duplex (Shared) Worldwide
8110	Marine Simplex/Duplex (Shared) Worldwide
8113	Marine Simplex/Duplex (Shared) Worldwide
8116	Marine Simplex/Duplex (Shared) Worldwide
8119	Marine Simplex/Duplex (Shared) Worldwide
8122	Marine Simplex/Duplex (Shared) Worldwide/Royal Australian Navy Worldwide <A4>
8125	Marine Simplex/Duplex (Shared) Worldwide/Federal Aviation Administration (FAA) Network Nationwide (USB/LSB/ALE)
8126	US Coast Guard 9th District Network (USB/ALE)
8128	Marine Simplex/Duplex (Shared) Worldwide
8131	Marine Simplex/Duplex (Shared) Worldwide
8134	Marine Simplex/Duplex (Shared) Worldwide
8137	Marine Simplex/Duplex (Shared) Worldwide
8140	Marine Simplex/Duplex (Shared) Worldwide
8143	Marine Simplex/Duplex (Shared) Worldwide
8146	Marine Simplex/Duplex (Shared) Worldwide
8149	Marine Simplex/Duplex (Shared) Worldwide
8150	US Navy SESEF discrete Norfolk, VA
8152	Marine Simplex/Duplex (Shared) Worldwide
8156	Bahamas Defense Forces
8157	US Army National Guard Nationwide (USB/ALE)
8158	Marine Simplex/Duplex (Shared) Worldwide
8161	Marine Simplex/Duplex (Shared) Worldwide
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BYOB - Bend Your Own Brackets

By Jim Hackett, KB1HWF

After months of trying to figure out how I was going to mount both my 2-meter rig and my wide-band scanner into the limited confines of my '87 Honda Accord (photo 1), I was on the verge of resorting to spending mega-bucks on a multi-radio mounting bracket and drilling holes through the floor boards. Then I heard about a low cost tool that would allow me to make my own professional quality bracket. Not only would I save a bunch of money, and avoid promoting the inevitable invasion of the New England Rust Monster, but, when the next car needs to be rigged up I'll be ready to bend another custom bracket.



As luck would have it, I attended the "Emergency Communications Training Course SC-1," as presented by Dr. John Allocca (WB2LUA), to my fellow members of the Waterbury Area Radio Club (<http://www.qsl.net/w1las/>), in Prospect, CT. John brought with him his, "Emergency Communications Portable Base Station II," which is pictured on The Larkfield Amateur Radio Club's web site http://www.larkfield.org/emergency_station.htm. This is a sweet set up – lift it out of the component case, plug in the power source and antenna coax, have a seat, and go. Talk about prepared!

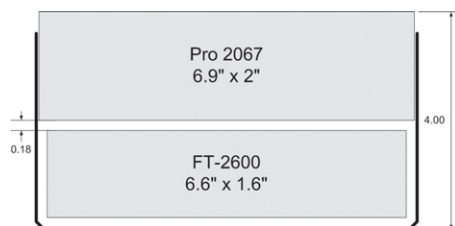
When John mentioned that he uses a metal bending tool that he got from McMaster-Carr to bend flat stock into mounting brackets, that was when I solved my mobile mounting mystery. (I came across a McMaster-Carr catalog in an abandoned concrete plant back when I was a 13-year-old CBer, and "Convoy" topped the pop charts. I remember spending hours looking through its thousands of pages and being totally amazed at what you could actually buy if you had a really good allowance.)

After the course presentation, I went home, got on-line, and surfed to <http://www.mcmaster.com> to find a Bench-Mount Press Brake (item number 2409A11) for just \$29.97. It's 18" wide and handles brass or steel flat stock up to 16 ga. Now, I'm no expert, but the 16 ga. steel looks exactly like the material used for the stock bracket that came with my Yaesu FT-2600M. The catalog states that you will also need to purchase a pair of C-clamps for operation. A trip to my favorite hardware store's bargain bin proved fruitful here for a couple of bucks.

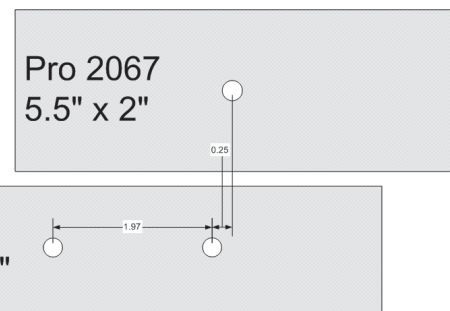
◆ Proof it on Paper

While my new tool was in transit, I created a template for the bracket-to-be. This was a multi-step process that allowed me to proof my initial measurements and make adjustments without wasting flat stock in aggravation-filled trial and error. I used my computer, running Microsoft's Visio software, but a decent word processor with line and shape drawing functionality will do (as will a ruler and pencil, for that matter).

First, I drew a front-view silhouette of the radios. Knowing that I had a height of just over 4" to fit them into, I was able to figure how best to space them above the mounting surface and between each other for good ventilation. Also, I could estimate what size spacers I would need for the smaller radio (see fig. 1).

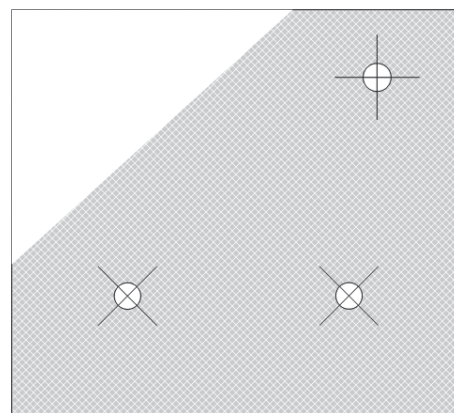


Second, I made drawings of the side-profile of each radio. After positioning the mounting points of each, I combined them into a profile of the two radios together, as they would be positioned when installed (fig. 2). I printed this out and cut off the excess paper to confirm that my initial configuration would actually fit where I thought it might. I got



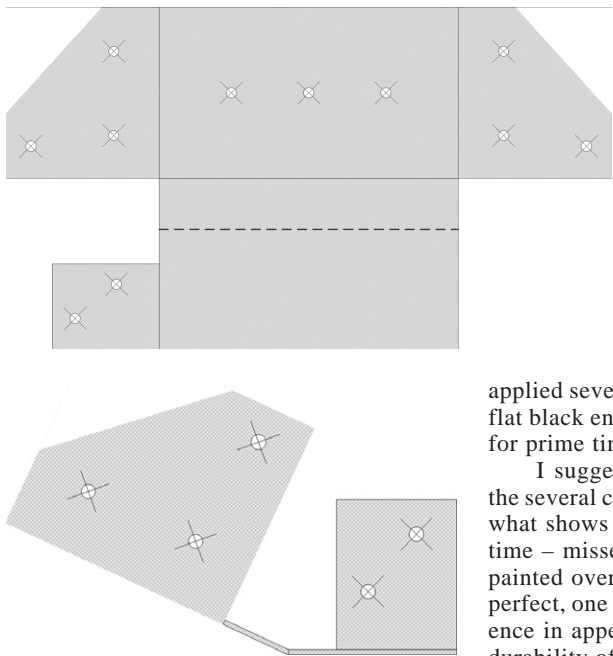
lucky first time on this one.

Third, using the mounting holes established in the previous step, I determined what size and shape the vertical tabs of the bracket would need to be. After printing this out, I used a hole-punch to open the mounting points and confirmed that they were positioned correctly by placing it against the radios. Good thing I used a paper template on this one, since I had to adjust the width between the points for the Yaesu a little bit for the final configuration. The resultant shape (fig. 3) was mirrored and attached onto each end of a rectangle wide enough to form the base.



Finally, I extended the base beyond the rear of the radios to provide additional support, deflect heat away from the carpet, and to create another vertical tab for an external speaker mounting point (fig 4). The three mounting points for the base of the rack were determined by copying the Yaesu stock mount's configuration.

The dotted line in Figure 4 shows where



I put a 30° bend to conform to the installation location. Figure 5 shows the side view of what the finished product would look like.

◆ Letting the Sparks Fly

I purchased an 8" x 24" piece of 16 ga. flat stock steel, and used a table saw with a metal cutting blade for most of my cuts. I used a saber saw with a metal cutting blade for the tighter cuts. Next, I used a rat-tail file and my Dremel MultiPro tool, fitted with an aluminum oxide grinding wheel to de-burr and round off the edges. Before taping my template onto the blank and drill-pressing all the holes, I cleaned the metal blank with a brass wire-wheel and steel wool. Once the holes were drilled I de-burred those areas and bent the bracket into shape.

Since I did not want to have the knobs that came with the Radio Shack[®] Pro-2067 protruding from the sides of my rack, I found a pair of machine screws with the same threading, and a couple of metal washers to mount the scanner in place. I placed the rubber washers that came with the scanner between the bracket and the unit to dampen vibration.

To mount the Yaesu, I found some bolts with the same threading as the stock bolts (careful here; these are metric!), but longer, to compensate for the space between my mount and the chassis. These had to be cut down a little bit so they did not protrude too

far into the radio chassis, and then de-burred with the Dremel grinding stone. I purchased four nylon spacers and cut them to size to center the rig into its new home. While doing a trial fitting, I mounted the microphone clip using one of the Yaesu mounting bolts, and marked where I would have to drill my final hole to finish the rack.

Finally, once that last hole was drilled and de-burred, I applied several very thin coats of Rustoleum flat black enamel, and the bracket was ready for prime time (photo 2).

I suggest you take your time applying the several coats of paint. You'll be surprised what shows up after a day or two of drying time – missed that spot, a piece of dust got painted over here, etc. And, even if it looks perfect, one more coat can make a big difference in appearance, and adds to the overall durability of the finish.

◆ A Mounting Theory

My goal here was to be able to bolt the bracket to the plastic center console, without having to drill holes in the floor of the car, and without cracking the plastic after a few months of shakes and rattles on the road. The angled extension of the base would sit on the floor, acting as a heel to prevent the unit from flexing the console, or at least minimizing any flex. In order to strengthen the point where the bracket is bolted to plastic, I used a 4-1/2" x 1-1/2" strip of 1/4" plywood to brace the under-side. This distributes the load across a wider footprint (as opposed to just three points) to reduce the possibility of cracking the console.

I also used over-sized washers (5/16 X 1") between the nuts and the wood to further dissipate any stress on the wood itself (see photo 3). To help keep the bracket from jostling loose over time, I used stop nuts to secure things nicely. If the plastic console had a significant arc to it, I would have cut grooves through the top layer of the plywood to allow for some flex in the wooden brace.

◆ Bolt it Down

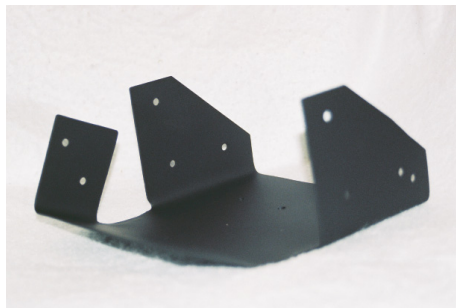
To install everything in place, I removed the center console, and bolted the bracket onto it. Next, I bolted the speaker bracket to the radio bracket and the console was then fitted back into position and re-secured. Finally, the radios were installed, the speaker was bolted into its



bracket, and all the wiring connected.

Photos 4 & 5 show the final results. The radios are solidly installed into the small space available with nothing getting in the way when I drive my new shack to work and back. Maybe it's just me, but I love being simultaneously tuned into my favorite AM broadcast station, one of the local 2-meter repeaters, and the local public safety groups. An informed rag chewer is a happy rag chewer.

The installation of the radios was completed as it was getting cold here in the North-East, so I planned to wait until this spring to install a couple of accent lights to illuminate their face plates, and a custom power distribution unit complete with a 20-amp noise filter and dual-fused power connection points. Good thing I still have some flat stock left over!



This is your equipment page. Monitoring Times pays for projects, reviews, radio theory and hardware topics. Contact Rachel Baughn, 7540 Hwy 64 West, Brasstown, NC 28902; email editor@monitoringtimes.com.

The Well-Dressed First-Responder

Before we plunge into this month's subject, a big tip of the hat and a ceremonial hoisting of the coffee mug to Bill Schweikert of Northfield, MA, who emailed me back in October, referring me to Moore Manufacturing in Skykomish, WA (<http://www.mooremfg.com>). Most of what follows is a direct result of Bill's suggestion.

If there is one thing that sets *MT* readers apart from the general population in their apparel, it's that *MT* readers, on occasion, like to wear radios. Of the folks who wander the planet, the guys and gals who subscribe to *MT* are high on the list of people who are likely to be found with a scanner, an amateur radio handtalkie or an FRS/GMRS two-way on their person. Some of them, I suspect, have the nagging feeling that they are only partially dressed if they leave the house without some familiar piece of radio gear stuffed into a pocket or hanging from a belt.

As a sometime radio wearer, I have come to realize that the portable radio as a fulltime companion is a mixed blessing. If you have a teensy handtalkie tucked into a shirt pocket, it tends to fall out if you bend over . . . to tie your shoe, for example. If you have a big HT – like my beloved Icom 2SRA – attached to your belt with a radio holster, belt clip or one of those other attachment gizmos, it tugs inexorably at your pants. (I once asked a surveyor why he was wearing a pair of wide red suspenders. 'To keep from mooning people,' he said, and then went on to point out all the gear that hung from his belt. The total weight must have been seven or eight pounds. While our radios weigh less, the principle is the same; gravity always wins.)



The CM Pro will hold a bunch of gear very comfortably for first responders.

And if you're in a situation where you have to get in and out of vehicles or amusement park rides, you don't have to be Einstein to figure out that a radio on your hip can be a real pain. The annoyances can range from jamming the radio against you to inadvertently detaching the radio when the belt clip slides up and off your belt. I've nearly lost a couple of FRS radios that way at amusement parks.

And that brings us neatly to Moore Manufacturing. They manufacture the CM Pro radio harness, which is just the ticket for first-responders – like members of search and rescue teams, ski patrol, and so forth – or anyone wants their radios securely attached to them but instantly available. The CM Pro straps to your chest and is lightly padded. It has two two-inch-wide shoulder straps and a strap that goes around your waist. All the straps are fitted with plastic snap clips so that the harness is easy to remove, and quick adjusters so that the harness can be fitted close to your body and won't flop and bang around when you're moving.

The CM Pro has one radio holder that is Velcro-adjustable to fit virtually any radio, including very large HTs. In addition, there is a second pocket that can be used to hold a cell phone, GPS, scanner or second HT. There are also a pen holder, a mini mag light holder, and a remote microphone loop, plus twin elastic antenna keepers. At the top of the harness is a good-sized zippered pocket where you can stash a map, extra batteries, and other possibles. (It's also available in breathable mesh, custom colors, left-hand models and with reflective trim.) It seems to me this is an excellent piece of gear, well-made and well worth the price of \$39.95.

◆ When Less is Better

Yeah, but maybe you don't want all that capability, maybe you just need a convenient way to carry and use your FRS two-way. No problem. Moore Manufacturing is also a distributor for the Hands-Free radio harness. The Model 103 is a three-point fully adjustable harness that holds your FRS handtalkie high enough on



The Hands-Free 103 harness makes wearing an FRS radio quick and easy.

the left side of your chest that you can simply click the button and talk.

And, of course, the speaker is near enough to your head to make hearing transmissions easy as well. Everything adjusts to hold your radio snugly and to hold it comfortably close to your body. Again, this is one terrific piece of gear and that easily justifies its \$25 price tag. For more info on either of these harnesses, contact Moore Manufacturing at 360-677-2442 or visit <http://www.mooremfg.com>.

◆ Soft Touch

And that brings us to our last gadget for this month. If you want to listen privately while you are wearing your radio harness or to simply listen quietly in any situation (I like to listen to short-wave while my wife sleeps next to me), let me commend to you C. Crane Company's Voz™ Earpiece. It has a very – I mean *very* – soft flexible loop that wraps around your ear, a crisp mono speaker, a 49.5" cord, a 1/8" stereo plug and adjusts for either right or left ear.

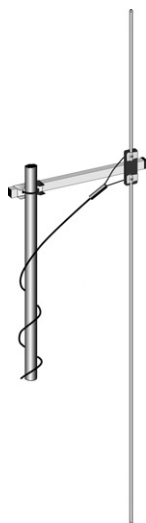


The Voz earpiece is super comfortable.

When C. Crane claims you can listen for hours in comfort, they're right. It really is so soft and gentle on the ear that you hardly know it's there. The Voz has now replaced my headphones at my nighttime listening post, and I can recommend this earpiece without reservation. The cost is just \$12.95. For more info, contact C. Crane at 800-522-8863 or visit <http://www.ccrane.com>.

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THE SCANTENNA

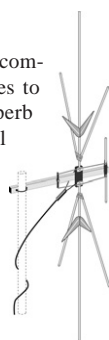
This omnidirectional scanner antenna will equal or outperform any competitor on the market. Its dipole-cluster design utilizes broadband techniques to provide continuous frequency coverage from 25-1300 MHz, offering superb reception of public safety, civilian and military aircraft, hams, personal communication devices, maritime, CB—anything in its frequency range!

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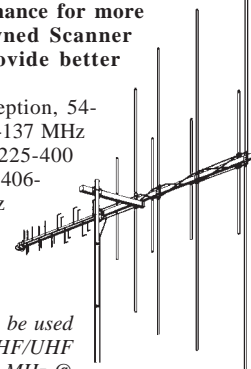
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• **HAMS NOTE:** The Scanner Beam can be used for transmitting up to 25 watts on VHF/UHF with the following average VSWR: 50 MHz @ 1.9:1, 144 MHz @ 3:1, 222 MHz @ 3:1, and 430 MHz @ 1.5:1. 50-72 ohms nominal impedance.

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The discone antenna is used by government and military agencies worldwide because of its wide bandwidth characteristics and non-directional coverage. Now Diamond offers a professional grade discone at a popular price.

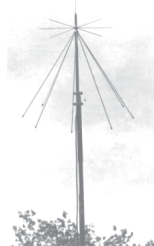
Designed for use with wide-frequency coverage VHF/UHF scanners and receivers, the Diamond D130J discone consists of 16 rugged, stainless steel elements and is capable of transmitting up to 200 watts in the amateur 50, 144, 220, 432, 900, and 1200 MHz bands.

As a receiving antenna, the D130J is omni-directional for continuous 25-1000 MHz (and above) coverage. A base-loaded, vertical top element is used as a low band (30-50 MHz) frequency extender.

The elements are arranged on a 24-inch support pipe equipped with two strong mounting brackets to accommodate any standard mast-pipe (1" to 2-1/8" diameter).

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What's NEW

Tell them you saw it in Monitoring Times

Two Books for Grundig Fans

— Review by Kevin Carey

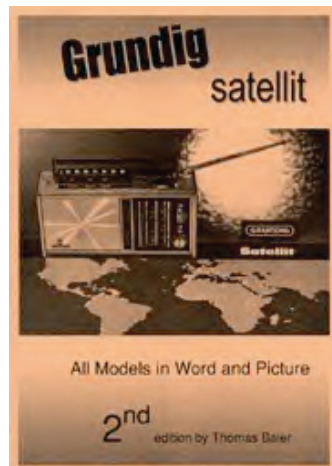
I've always had a soft spot for Grundig radios. When I was first getting started in the longwave hobby, I scoured many hamfests looking for a receiver — any receiver — that would allow me to hear the mysterious signals below 500 kHz. Like most 16-year olds, my budget was quite limited. I couldn't afford a \$500+ receiver to get on the band — that was something I could only dream of. I'd need to settle for something used.

At the time (late 1970s), longwave coverage was uncommon even on higher end receivers, so I was not having much luck finding that special rig at the local hamfest. I was about to suspend my search, when I spotted a "\$2 Grab Box" laying on the ground. In the bottom of the box I found an old, dusty portable radio that bore the label "Grundig" and the dial markings SW, MW, and LW. The "LW" selection was the only one that mattered to me. Immediately upon getting home, I loaded the set with batteries, turned it on, and was delighted to find that it worked just fine. I was finally hearing beacons!

It was with this fond memory that I took a keen interest in two recently published books by Thomas Baier, both dealing specifically with Grundig radios. They are titled *Grundig Satellit—All Models in Word and Picture*, and *The Great Grundig Satellit 700*. Both books are storehouses of information for anyone who collects, operates, or simply appreciates the quality of Grundig Satellit receivers.

Grundig Satellit—All Models in Word and Picture is, as the name implies, a comprehensive listing of all Satellit series radios from 1964 on. I say "listing," because the book is not a coffee table-type tome with glossy photos and lots of flowery editorial. It takes a matter of fact approach to covering the series with no excessive fanfare. What you do get, are front, side, and rear views of

19 different models, tuning string diagrams for many sets, technical specifications, and some commentary on each model. The author does a good job of discussing the lineage and variations of each model. He also includes a helpful "Before you Buy" section with a grading system for determining a set's worth and rarity, with all values based in U.S. dollars.



An "Extra Pics" section at the back of the book includes supplementary photos of Grundig advertising, views of the factory, and even some pictures of Max Grundig himself. While the book is printed in black and white, the author maintains a website where color photos of many models may be viewed. You'll find this site at: <http://www.grundigsatellit.de>.

Grundig Satellit—All Models in Word and Picture, 2nd ed., by Thomas Baier, September 2001, 143 pages, b/w, Softcover, Price: \$19.95

The Great Grundig Satellit 700 is a much more detailed book, focusing squarely on the 700 model. It contains lots of historical background, operating tips (and tricks) as well as large reprint sections from the instruction and service manuals for the model. Indeed, if you lack a user's manual for the set, this book would probably fill the need quite nicely. By the way, it includes full schematics and a parts list for the radio.



As with the previous book, you probably won't use this one to adorn the coffee table. It's very much a technical treatise for the venerable 700.

I found both books to be very useful for their intended audience, and would recommend them for the bookshelf of any Grundig aficionado. My English versions suffer from somewhat rough translations here and there, but there are no major gaffs that can't be figured out from the context.

The Great Grundig Satellit 700, 1st ed., by Thomas Baier, April 2002, 124 pages, b/w, Softcover, Price: \$24.95

Both books are available from Universal Radio, Inc., 6830 Americana Pkwy., Reynoldsburg, OH 43068-4113. To order, call (800) 431-3939, or visit Universal Radio online at: <http://www.universal-radio.com>.

Zenith: The Glory Years, 1936-1945

by Harold Cones, John Bryant and Martin Blankinship

Among the prize collectibles in the antique radio market, the name Zenith stands by itself, a monument to quality and satisfaction in broadcast listening for American households and worldwide as well.

This newly-published pair of books is part of a succession of volumes which began in 1997



with *Zenith Radio, the Early Years, 1919-1935*, and the 1994 publication, *The Zenith Transoceanic, the Royalty of Radios*.

This newest compendium focuses on two areas of Zenith: its history and people, and an illustrated database and catalog of its products.

Volume 1 treats us to a visual feat of day-to-day operations of the Zenith Corporation, with excellent photos of in key personnel, assembly lines, test equipment, advertising, engineering, war contracts, official correspondence, original artwork for designs of radios, and a fine color collection of radios. Representative market prices for each model are included for collectors to gauge values.

Volume 2 is a comprehensive collection of images of virtually every product ever produced by Zenith during the period 1936-1945. It contains a large collection of original ads, and its tables reflect years of manufacture, frequency coverage, list price, model and chassis number, speaker size, name, quantity produced, style, number of tubes, power source, relative rarity, and a collector's value guide.



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— Review by Bob Grove

ARRL Periodicals on CD-ROM

The American Radio relay League has released their 2003 anthology of their popular journals on a compact, fully-searchable CD-ROM. Every word and photo published throughout the year is included for *QST* – The official membership journal of ARRL; *NCJ* – National Contest Journal; and *QEX Forum for Communications Experimenters*.

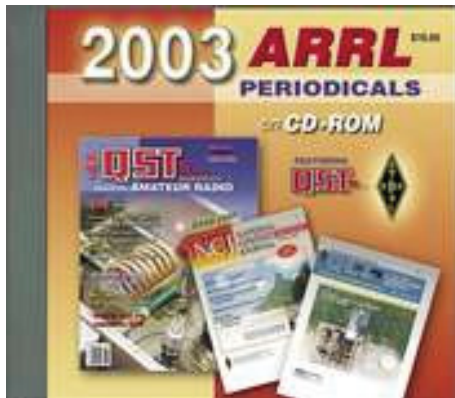
Using the Adobe Acrobat engine you can search the full text of every article by entering titles, call signs, names – almost any word. You can see every word, photo (including color images), drawing and table in technical and general-interest features, columns and product reviews, plus all advertisements. You can print what you see, or copy it into other applications.

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- 2003, Microsoft Windows 98SE, ME, NT 4.0 with Service Pack 5, Windows 2000, or Windows XP; Macintosh PowerPC, MAC OS software version 8.6(*), 9.0.4, 9.1, or OS X(*) A * denotes that some features may not be available due to OS limitations

ARRL periodical anthologies on CD-ROM are available for 1995-2003 at \$19.95 plus shipping and handling and can be ordered from the ARRL website (<http://www.arrl.org>), on their toll-free telephone



line 1-888-277-5289 (Outside US +1-860-594-0355), or via snail mail at ARRL Publication Sales Department, 225 Main Street, Newington, CT 06111-1494 USA.

Galapagos Islands DX Diploma

Issued by the DX-TA-SEA DX CLUB (WW8DX), the Galapagos Islands "HC8/HD8 DX Diploma" multicolored diploma measuring 8.5 x 11 inches (21.5 x 28 cm) is awarded to Amateur Radio Operators and Short Wave Listeners for confirming contacts with (or SWL reception of) a minimum of three different HC8 or HD8 stations in the Galapagos Islands.

This award has been developed to recognize past Amateur Radio activities from the Galapagos Islands as well as to promote future DX operations from the two different HC8 & HD8 prefixes.

A special endorsement is available for those confirming QSOs with (or reception of) "8" different Galapagos Islands callsigns, one of which must be an HD8 callsign.

"Equatorial Line Diploma"

Also issued by the DX-TA-SEA DX CLUB (WW8DX), is the Republic of Ecuador-HC/HD DX Award "Equatorial Line Diploma" LATITUDE 0°0'0". This multicolored diploma is awarded to Amateur Radio Operators and Short Wave Listeners for confirming contacts with (or SWL reception of) the 20 different Ecuadorean HC & HD prefix areas, HC1-HC0 and HD1-HD0 (including HC8/HD8-Galapagos Islands and HC9/HD9 & HC0/HD0-Special Event and Contest Prefixes).

- Class D-(Brass) - contacts with (reception of) 1-5 prefixes
- Class C-(Bronze) - contacts with (reception of) 6-10 prefixes
- Class B-(Silver) - contacts with (reception of) 11-15 prefixes
- Class A-(Gold) - contacts with (reception of) 16-20 prefixes

A special trophy will be awarded free of charge to those holding the Class A (Gold) Diploma + confirming all 20 prefixes.

The following application information applies to both diplomas:

All contacts or SWL reports must be made after November 20, 1945. Contacts may be made using different personal callsigns, but, they must be made from within the same DXCC country. Endorsements are available by BAND, MODE or QRP <5W.

Fees: Basic diploma with any amount of endorsement stickers- \$5.00 U.S. (or equivalent – foreign currency accepted at current exchange rate) or 10 IRC's (valid ONLY if

properly stamped).

Class endorsements: (any amount) at later dates: SAE + \$2.00 U.S. (or equivalent) or 4 IRC's.

All awards and endorsements are free to Ecuadorean (HC & HD8) Amateur Radio Operators and SWLs.

DO NOT SEND QSLs: Send list of QSO's or GCR list indicating: Station Worked (or heard), Date, Band, Mode & special endorsement requested to:

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Books and equipment for announcement or review should be sent to "What's New?" c/o Monitoring Times, 7540 Highway 64 West, Brasstown, NC 28902. Press releases may be faxed to 828-837-2216 or emailed to Rachel Baughn, editor@monitoringtimes.com

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Weather Satellite Reception Basics

Although I would hope that anyone reading this column for the first time would be able to understand the terms used, I am sure that an updated background description should occasionally be included. The column is about weather satellites (WXSATs) and summarizes the status of the current satellite constellations, together with notes about any recent problems.

There are literally thousands of people around the world who have set up receiving stations. Some stations include basic systems that receive the relatively simple APT (automatic picture transmission) telemetry, WEFAX (weather facsimile) image reception, or the much more advanced high resolution picture telemetry (HRPT) or even Primary Data reception. The choice is usually dictated by one's available funds. In many cases, users start by setting up a simple APT station, and find the results so amazing that they often install more advanced equipment at a later time.

I set up my first APT station during the late 1980s, after leaving the world of professional satellite monitoring (an oft regretted decision). After extensive reading about the NOAA and Meteor satellites, I could hardly wait to receive and decode my first picture. Much has changed since that time because computers have developed enough to be used for the signal decoding process. We no longer need to build a hardware decoder equivalent (the framestore).

For APT reception we require a suitable antenna for the 137 MHz right-circularly polarized telemetry from the NOAA satellites (see the list of frequencies at the end of this column). You can buy a crossed dipole or, if funds are available, a quadrifilar helix antenna. By mounting this as high as possible, you should receive a good signal from NOAA-12, NOAA-15 and NOAA-17 when they pass over your station.

Weather satellite receivers are specialized and not to be confused with standard utility receivers. You can sometimes find one for sale at a discount from members of local radio clubs, or you can search the web for a dealer. Software is usually included with a complete system. With little more than an antenna and receiver to buy, APT reception is inexpensive and very popular.

Each NOAA satellite is in a near polar orbit, conveniently spaced so that we receive about three passes from each, traveling southbound and then several hours later traveling northbound. The satellites are a few hundred kilometers above the earth, and provide us with a view that presents a wide perspective of the region

surrounding our stations, yet detailed enough to show cloud fronts and even different types of cloud. Hardly surprising that once you have seen a few live pictures, you want to stay and watch the others coming in!

❖ NOAA-16 on the mend

Although evidence of a problem with the high resolution picture telemetry (HRPT) from NOAA-16 was detectable as long ago as September last year, I had not noticed it. The evidence took the form of a slightly wavy feature on the left-hand side (of ascending pass images). The feature began to increase and a sharp-eyed observer commented on it via one of the Internet mailing lists.

The Spacecraft Operations Control Center (SOCC) reported that NOAA-16 AVHRR/MIRP re-synchronization commands were being executed daily. Next, the Temperature Control Electronics (TCE-24) of the AVHRR heater/louver was turned off in an attempt to raise the temperature of the local area in an attempt to recover additional lubricant for the scan motor. This early stage in the recovery procedure led to a welcome improvement.

For several weeks following this procedure, imagery stayed nominal. The 'wavy lines' feature apparently developed later and was acknowledged by NOAA. They announced that on January 16, the TCE-24 (heater/louver) would be turned back on. With the AVHRR (scanner) running at record high temperatures, the scan motor surged to high values and imagery degraded significantly, producing a bar code pattern. The significant deterioration in image quality left NOAA-16 images appearing similar to those being received from NOAA-14.

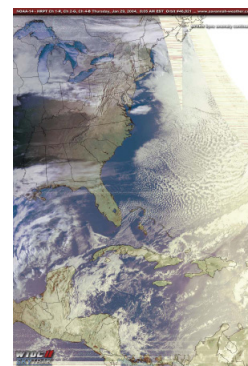
NOAA-16's scanner TCE-24 was re-enabled, and after three days of operations, the instrument stabilized with a temperature about 4 degrees lower (~21.0° C versus ~16° C). The scan motor current indicated a decreasing trend with slightly improved performance apparent at about 17.5° C. The images are again usable and the current operations plan is to leave the AVHRR in the current configuration with the TCE enabled.

❖ NOAA-14 monitoring

Patrick Prokop is a meteorologist with his own extremely well equipped WXSAT monitoring station. Patrick's facilities include a home-based quadrifilar antenna for APT reception, and an HRPT dish on controlled mount located at the local TV station. Patrick's own house has some very large trees nearby that cause severe interference to reception, hence his deci-

sion to reposition.

Patrick's NOAA-14 image – see figure 1 – shows the interference patterns seen in most recent images. Sometimes the image is unusable, and sometimes, as in this example, the picture is largely of good quality. Patrick has an extensive web site that carries recent images from all the active NOAA WXSATs, and also pages with links to WXSAT-related sites, both official and amateur.



<http://www.savannah-weather.com>

Fig 1: NOAA-14 HRPT January 29 image from Patrick Prokop

Chuck Vaughn actively monitors the Chinese Fengyun WXSATs that transmit HRPT. He recorded the morning pass on February 2 that "revealed extensive ground coverage of snow in the northern plains states and southern Canada." Chuck added country/state outlines to put the picture into context.

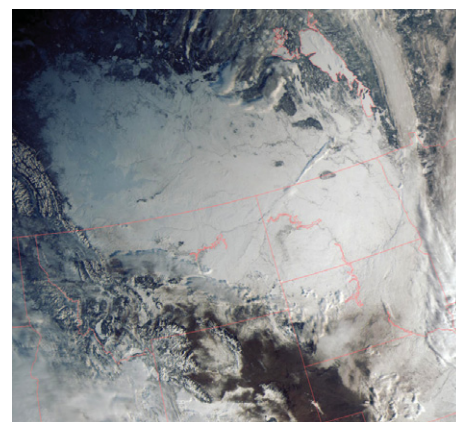


Fig 2: Fengyun-1D shows extensive snow cover on February 2 from Chuck Vaughn

Frequencies

NOAA-12 and -15 transmit APT on 137.50 MHz
NOAA-17 transmits APT on 137.62 MHz.
GOES-10 (west) and GOES-12 (east) use 1691 MHz for WEFAX
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Evolution of Technology: It's Not What You Think

By Ken Reitz

Whether or not you believe in Evolutionary Science, you know you believe in the evolution of technology. But, I'd like to challenge that view. First, a review to see where we are and how we got here.

It's 1876, Alexander Bell tells Watson he needs him and nobody's been able to get through dinner since. The phone has gone from a 25 pound wooden box on the wall, which for some reason you needed a step ladder to reach, to a 2 ounce piece of plastic with a video screen, caller ID, call waiting, voice mail, text messaging and Internet access. Evolution, so far, intact.

Now consider the radio. It's 1901 and Marconi builds an antenna system half the size of Newfoundland, houses tons of equipment in a shack just to tune in the only functioning transmitter on the globe which is sending static bursts of Morse Code from across the Atlantic. It's front page news. Today a tiny little tuner uses an antenna the size of a cigarette pack to pick up 100 channels of stereo programming from a satellite 20,000 miles away. Still going in the right direction.

What about TV? Seventy years ago folks clustered around a set the size of an old ice box to watch a round 3" TV tube and mostly what they got to see was a black & white test pattern! Today you can watch a dozen channels of color TV on a 3" LCD screen on a set small enough to fit into your shirt pocket and still have room for the cell phone. Full speed ahead!

Then there's recordings. Once again, it's 1877 and Tom Edison is rasping a child's poem into the horn of a contraption which reproduces his voice onto a wax cylinder. He plays it back and a wobbly, tinny voice comes squeaking back at him through the horn. Today plastic discs, electronically imbedded with 1's and 0's, whirl around at the speed of a dentist's drill inside playing units barely bigger than the disc itself giving nearly flawless reproduction of the sound as originally recorded. It's the pinnacle of audio progress, isn't it?

Now comes word from a media think tank called Forrester Research which, in a widely reported study, says that CDs are about to disappear faster than America's once celebrated Treasury surplus. Not only that, but, as Forrester's chief analyst Josh Bernoff told CNN.com "...CDs, DVDs, and any other forms of physical media will become obsolete."

Wait a minute! Half the country hasn't even gotten DVD players yet and they're going to be obsolete? We're finally

getting rid of wobbly, cumbersome video tapes with their herky-jerky video, weird features none of us could figure out, and we're replacing them with crystalline DVD images on players even old folks could use and now they're going to be obsolete? Do you call that progress?

In the same CNN.com piece a pop music magazine editor is quoted as saying that "The CD is turning out to be a transitory sort of item..." Really? Too bad they didn't print that on the CD player box or put it in the ad literature before you bought it. Hold it, I'm sensing a trend!

The dreary news of the demise of the CD falls directly on the heels of the announcement that the entire fleet of those elegant, supersonic Concorde airplanes is to be scrapped. Are you kidding? We're going to give up on the dream of air travel at twice the speed of sound in favor of big, lumbering planes with all the appeal of a cattle car. That can't be progress!

Then, finally, word from Detroit: General Motors has pulled the plug on hybrid vehicles. They're crushing all but a few of their advanced design cars which would have at last given us the chance to get high gas mileage *and* dramatically reduce pollution. Say it ain't so!

To those of you still clinging to your old cassette decks, Betamax VCRs, LazerDisc players, and analog TV sets I say: make room for your old CD and DVD players. Don't even bother having a yard sale.

Now, take a look at the TV industry which is in the process of a total makeover where the buzzwords are "on-demand, upscale formats and enhanced technologies." We're now in a time where the life span of the new technology is half its predecessor. And that's a good thing because construction on the new technology is often so poor it just barely survives until the replacement technology comes on-line.

Well, nothing lasts forever, except Bakelite telephones and wooden box radios, but if this really is the direction we're going I think we'd better open up a few more landfills.

This page is open to thoughtful opinions on radio-related topics. Views expressed on this page do not necessarily reflect the opinion of Monitoring Times or Grove Enterprises.



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IC-PCR1000

TURN YOUR PC INTO A WIDE BAND RECEIVER WITH ICOM'S LITTLE BLACK BOX!

Now with
Bonito Software!

The image shows the RadioCom 4.0 software interface for the ICOM IC-PCR1000. The interface includes a frequency display at the top showing 98.100000 MHz. Below this is a table of memory channels with columns for Frequency (K...), Range (KHz), Mod..., IF, Dec..., Mode, Baud, Mark, Shift, Pola..., Stop..., and Description. The table lists several channels, including 145.330 (FM, 15000, AUS, 0, 0, 0, 0.0, Bears), 146.960 (FM, 15000, AUS, 0, 0, 0, 0.0, Seattle Rptr), 98100.000 (WFM, 2300..., AUS, 0, 0, 0, 0.0, King FM), 10000.000 (AM, 6000, AUS, 0, 0, 0, 0.0, WWW), and 15000.000 (AM, 6000, AUS, 0, 0, 0, 0.0,).

Red arrows point to various features in the software interface and the hardware unit:

- Volume**: Points to the volume control slider in the software interface.
- Squelch**: Points to the squelch control slider in the software interface.
- Sound Card Controls**: Points to the audio parameter section in the software interface.
- Modes**: Points to the mode selection buttons (USB, CW, FAX, etc.) in the software interface.
- Memory Channels**: Points to the memory channel table in the software interface.
- Functions**: Points to the function buttons (Listen, Record, Play, etc.) in the software interface.
- Digital Decoder/DSP Functions**: Points to the digital decoder section in the software interface.
- Filter Softening**: Points to the filter softening control in the software interface.

The hardware unit is a small black box with the ICOM logo and 'IC-PCR1000' printed on it.

100 kHz – 1.3 GHz†
AM, FM, WFM, USB, LSB, CW
Unlimited Memory Channels

Real Time Band Scope

IF Shift

Noise Blanker

Digital AFC

Voice Scan Control

Attenuator

Tunable Bandpass Filters

AGC Function

S Meter Squelch

CTCSS Tone Squelch

Computer Controlled DSP

Turn your PC into a Wide Band Receiver! ICOM's IC-PCR1000 uses the power of your computer to open a new world of listening and viewing pleasure. Compatible with most PCs and laptops running Windows™ software, the 'PCR1000 connects externally — in just minutes! The new Bonito software (BON CS40) expands and enhances the 'PCR1000's versatility with the following features:

Basic Radio Control functions with spectrum scope

Computer Controlled DSP for tailoring your audio with separate bass & treble controls

Filter Smoothing for the upper and lower ends of the audio spectrum

Notch Filter reduces annoying pops, buzzes, & other interference for a crisp, clear signal. Use the power of your computer's sound card DSP to bring out the beauty of the signal for hours of enjoyable listening

Digital Decoding Package transforms your computer into a decoding machine. You no longer have to purchase an external decoder for receiving non-encrypted digital modes. Digital Decoding allows you to decode: **RTTY**, **FAX** with Zoom, Synchronize, Slant Correction, Cut a Picture, Picture Invert and Rotate, **CW**, **SSTV** with Auto Sync, Slant Corrections, **Sitor-B**, **PSK31**

Audio Record function allows you to record your favorite radio programs, local traffic, or almost anything else with your computer's sound card and hard drive. Save for friends and family to listen at a later time

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